

April 27, 2015

Mr. James Johnson On-Scene Coordinator U.S. Environmental Protection Agency, Region 7 11201 Renner Boulevard Lenexa, Kansas 66219

Subject: Data Deliverable Package 10

West Lake Landfill Site, Bridgeton, Missouri

CERCLIS ID: MOD079900932

EPA Region 7, START 4, Contract No. EP-S7-13-06, Task Order No. 0058

Task Monitor: James Johnson, On-Scene Coordinator

Dear Mr. Johnson:

Tetra Tech, Inc. is submitting the following analytical laboratory reports with associated data validation reports for sampling at locations off-site of the West Lake Landfill Site in Bridgeton, Missouri.

Sample Delivery Group	Analysis Type	Sample Collection Date
J10545	Alpha-emitting Ra and Isotopic U/Th	02/11/2015
J10616	Alpha-emitting Ra and Isotopic U/Th	02/18/2015
J10707	Alpha-emitting Ra and Isotopic U/Th	02/25/2015
J10788	Gamma scan and gross alpha/beta	03/04/2015
J10788	Alpha-emitting Ra and Isotopic U/Th	03/04/2015
J10908	Gamma scan and gross alpha/beta	03/13/2015
J10908	Alpha-emitting Ra and Isotopic U/Th	03/13/2015
J11120	Gamma scan and gross alpha/beta	03/27/2015
J11233	Gamma scan and gross alpha/beta	04/03/2015
60188508	Volatile Organic Compounds	02/20/2015
60189050	Volatile Organic Compounds	02/27/2015
60189577	Volatile Organic Compounds	03/06/2015
60190027	Volatile Organic Compounds	03/13/2015
60191132	Volatile Organic Compounds	03/27/2015
P1500832	Hydrogen Sulfide	02/27/2015
P1500900	Hydrogen Sulfide	03/06/2015
P1501117	Hydrogen Sulfide	03/13/2015
P1501192	Hydrogen Sulfide	03/20/2015
P1501359	Hydrogen Sulfide	03/27/2015

Mr. James Johnson April 27, 2015 Page 2

If you have any questions or comments, please contact Rob Monnig at (816) 412-1775.

Sincerely,

For Dave Kinroth

START Project Manager

Ted Faile, PG, CHMM START Program Manager

Enclosures

cc: Debra Dorsey, START Project Officer (cover letter only)

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 20, 2015
Sample Delivery Group (SDG):	J10545
Sample Numbers:	WAA-01-AF-PS-20150211, WAA-02-AF-PS-20150211, WAA-03-AF-PS-20150211, WAA-04-AF-PS-20150211, WAA-05-AF-PS-20150211, and WAA-00-AF-FB-20150211
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Laboratory Agency Radiological Interest as a second package of the summary data package.	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data addition criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10545 included five (5) environmental air (filter) samples and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and uranium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) and field blanks yielded low activities for one (of three) thorium isotopes but none of the three uranium isotopes. No qualifications were applied. The field blank yielded a low activity for total alpha radium activity. A similar activity was seen in one field sample, but the other field sample results were nondetected. The radium result for field sample WAA-05-AF-PS-20150211 was qualified as nondetected due to media contamination and flagged "U" to indicate that.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10545-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher



Authorized for release by: 3/23/2015 9:31:26 AM

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com

----- LINKS -----

Review your project results through
Total Access

Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10545-1

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Job ID: 160-10545-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10545-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 2/19/2015 9:30 AM; the samples arrived in good condition, properly preserved. The temperature of the cooler at receipt was 18.0° C.

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-01-AF-PS-20150211 (160-10545-1), WAA-02-AF-PS-20150211 (160-10545-2), WAA-03-AF-PS-20150211 (160-10545-3), WAA-04-AF-PS-20150211 (160-10545-4), WAA-05-AF-PS-20150211 (160-10545-5) and WAA-00-AF-FB-20150211 (160-10545-6) were analyzed for Total Alpha Radium (GFPC) in accordance with SW-846 Method 9315. The samples were prepared on 03/02/2015 and analyzed on 03/05/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TestAmerica St. Louis 3/23/2015

Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Job ID: 160-10545-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150211 (160-10545-1), WAA-02-AF-PS-20150211 (160-10545-2), WAA-03-AF-PS-20150211 (160-10545-3), WAA-04-AF-PS-20150211 (160-10545-4), WAA-05-AF-PS-20150211 (160-10545-5) and WAA-00-AF-FB-20150211 (160-10545-6) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 03/03/2015 and analyzed on 03/10/2015 and 03/11/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150211 (160-10545-1), WAA-02-AF-PS-20150211 (160-10545-2), WAA-03-AF-PS-20150211 (160-10545-3), WAA-04-AF-PS-20150211 (160-10545-4), WAA-05-AF-PS-20150211 (160-10545-5) and WAA-00-AF-FB-20150211 (160-10545-6) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 03/03/2015 and analyzed on 03/10/2015 and 03/11/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

Chain of Custody Record

TestAm	erica
THE LEADER IN ENVIRON	MENTAL TESTING

13715 Rider Trail North

Earth City, MO 63045 phone 314.298.8566 fax	Requi	latory Pro	gram:	low F	NPDES	Г	RCR	Δ		Other:									TestAmerica Laboratories, I
Client Contact		- Carlotte Control Control	ave Kinrot	- Company of the last			_	-	-	ave K	inroth		Date	e: 2-16	-15				COC No:
Tetra Tech, Inc.		314-517-67		· · · · · · · · · · · · · · · · · · ·						ke Fr				rier: N					1 of 1 COCs
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(816) 816-410-1748 FAX		2	weeks			2	- 10		inm	독	를 다								Lab Sampling:
Project Name: West Lake Landfill Site		1	week			> 2	Bel	Spec	Radium	norit	9 (0		1 1				3		
Site: Bridgeton, MO		2	days			e (pha pha	E	ha	I o	22-1								Job / SDG No.:
PO# 1105610		1	day			Filtered Sample (Y/N	SAS	Gamm	9315 Total Alpha	A-01-R Isotopic Thorium	* 9315 Radium-226 (GFPC)								
			Sample			d S	Suc	R.	otal	8 8	Rac								
	Sample	Sample	Type (C=Comp,		# of	ere	9	GA-01-R	151	2 2	315								
Sample Identification	Date	Time	G=Grab)	Matrix	Cont.	Ē	9310 Gross Alpha/Beta	8	93	A 4	(*		\perp						Sample Specific Notes:
WAA-01-AF-PS-20150211	2/11/15	11:14	Filter	Air	1		Х		Х	X >	x x								* 9315 Radium-226 (GFPC)
WAA-02-AF-PS-20150211	2/11/15	10:14	Filter	Air	1	Ш	X	Х	Х	X >	ΧX								contingent upon TAR results
WAA-03-AF-PS-20150211	2/11/15	10:44	Filter	Air	1		X	X	Х	X 2	χX								for all samples
WAA-04-AF-PS-20150211	2/11/15	10:58	Filter	Air	1	Ш	Х	X	Х	X)	x x								
WAA-05-AF-PS-20150211	2/11/15	10:30	Filter	Air	1		Х	Х	Х	x >	x x								,
WAA-00-AF-FB-20150211	2/11/15	NA	Filter	Air	1		×	X	Х	X >	x x								
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Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5	=NaOH; 6=	Other																	
Possible Hazard Identification:	List on E	A Mosto C	adoc for the	compl	a in the	1	Sam	ole [Disp	osal (A fee	may	be as	sessec	l if san	nples	are re	etain	ed longer than 1 month)
Are any samples from a listed EPA Hazardous Waste? Please Comments Section if the lab is to dispose of the sample.	LISE ATTY EF	A Waste C	oues for the	Sample	e in the														
☑Non-Hazard ☐Hammable ☐Skin Irritant	Poisor	В	Unkno	wn		┪		Retur	n to (Client			Disposa	l by Lab			Archive	for	Months
Special Instructions/QC Requirements & Comments:								-	-		-							-	
Custody Seals Intact: Yes No	Custody	Seal No.:			·				Co	oler T	emp.	(°C): O	bs'd:_		Cor	r'd:_			Therm ID No.:
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Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Login Sample Receipt Checklist

Client: Tetra Tech EM Inc. Job Number: 160-10545-1

Login Number: 10545 List Source: TestAmerica St. Louis

List Number: 1

Creator: Daniels, Brian J

ordator. Buriolo, Britair o	
Question	Answer Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td>	True
The cooler's custody seal, if present, is intact.	N/A
Sample custody seals, if present, are intact.	True
The cooler or samples do not appear to have been compromised or tampered with.	True
Samples were received on ice.	N/A
Cooler Temperature is acceptable.	True
Cooler Temperature is recorded.	True
COC is present.	True
COC is filled out in ink and legible.	True
COC is filled out with all pertinent information.	True
s the Field Sampler's name present on COC?	N/A
There are no discrepancies between the containers received and the COC.	True
Samples are received within Holding Time.	True
Sample containers have legible labels.	True
Containers are not broken or leaking.	True
Sample collection date/times are provided.	True
Appropriate sample containers are used.	True
Sample bottles are completely filled.	True
Sample Preservation Verified.	True
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A
Multiphasic samples are not present.	True
Samples do not require splitting or compositing.	True
Residual Chlorine Checked.	N/A

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Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Quality Control

Relative error ratio

TestAmerica Job ID: 160-10545-1

Qualifiers

Rad

ND PQL

QC

RL

RER

RPD

TEF

TEQ

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Method	Method Description	Protocol	Laboratory
9315	Total Apha Radium (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10545-1	WAA-01-AF-PS-20150211	Filter	02/11/15 11:14	02/19/15 09:30
160-10545-2	WAA-02-AF-PS-20150211	Filter	02/11/15 10:14	02/19/15 09:30
160-10545-3	WAA-03-AF-PS-20150211	Filter	02/11/15 10:44	02/19/15 09:30
160-10545-4	WAA-04-AF-PS-20150211	Filter	02/11/15 10:58	02/19/15 09:30
160-10545-5	WAA-05-AF-PS-20150211	Filter	02/11/15 10:30	02/19/15 09:30
160-10545-6	WAA-00-AF-FB-20150211	Filter	02/11/15 00:00	02/19/15 09:30

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Lab Sample ID: 160-10545-1

Matrix: Filter

Client Sample	ID: WAA-0	1-AF-PS-20150211

Date Collected: 02/11/15 11:14

	l Apha Radiu	(0. 1 0)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Total Alpha Radium	0.444	d	0.470	0.472	1.00	0.761	pCi/Sample	03/02/15 09:17	03/05/15 18 12	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	82.0		40 - 110					03/02/15 09:17	03/05/15 18:12	
Method: A-01-R - Iso	otopic Thoriu	m (Alpha S	pectrometry)							
Management of the same			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Thorium-228	0.241	3	0.163	0.164	1.00	0.207	pCi/Sample	03/03/15 14:27	03/10/15 11:24	
Thorium-230	0.218	3	0.131	0.133	1.00	0.104	pCi/Sample	03/03/15 14:27	03/10/15 11:24	
Thorium-232	0.0218	The second secon	0.0574	0.0574	1.00	0.123	pCi/Sample	03/03/15 14:27	03/10/15 11:24	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Thorium-229	91.0		30 - 110					03/03/15 14:27	03/10/15 11:24	
	•	ım (Alpha S	Count	Total						
Analyte		Qualifier		Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
			Count Uncert.	Uncert.	RL 1.00	MDC 0.233		Prepared 03/03/15 14:27	Analyzed 03/10/15 11 22	
Uranium-233/234	Result	Qualifier	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)	1		pCi/Sample			
Uranium-233/234 Uranium-235/236	Result 0.115	Qualifier	Count Uncert. (2σ+/-) 0.142	Uncert. (2σ+/-) 0.142	1.00	0.233	pCi/Sample pCi/Sample	03/03/15 14:27	03/10/15 11:22	
Analyte Uranium-233/234 Uranium-235/236 Uranium-238	Result 0.115 0.0969 0.0389 %Yield	Qualifier (4)	Count Uncert. (2σ+/-) 0.142 0.108 0.0930 Limits	Uncert. (2σ+/-) 0.142 0.108	1.00	0.233 0.153	pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27 03/03/15 14:27 Prepared	03/10/15 11:22 03/10/15 11:22 03/10/15 11:22 Analyzed	Dil Fa
Uranium-233/234 Uranium-235/236 Uranium-238 <i>Tracer</i>	Result 0.115 0.0969 0.0389	Qualifier U/ W	Count Uncert. (2σ+/-) 0.142 0.108 0.0930	Uncert. (2σ+/-) 0.142 0.108	1.00	0.233 0.153	pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27 03/03/15 14:27	03/10/15 11:22 03/10/15 11:22 03/10/15 11:22	Dil Fa
Uranium-233/234 Uranium-235/236 Uranium-238	Result 0.115 0.0969 0.0389 %Yield 92.6	Qualifier U Qualifier	Count Uncert. (2σ+/-) 0.142 0.108 0.0930 Limits 30 - 110	Uncert. (2σ+/-) 0.142 0.108	1.00	0.233 0.153	pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27 03/03/15 14:27 Prepared 03/03/15 14:27	03/10/15 11:22 03/10/15 11:22 03/10/15 11:22 Analyzed	Dil Fac
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: tate Collected: 02/11	Result 0.115 0.0969 0.0389 %Yield 92.6 WAA-02-A /15 10:14	Qualifier U Qualifier	Count Uncert. (2σ+/-) 0.142 0.108 0.0930 Limits 30 - 110	Uncert. (2σ+/-) 0.142 0.108	1.00	0.233 0.153	pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27 03/03/15 14:27 Prepared 03/03/15 14:27	03/10/15 11:22 03/10/15 11:22 03/10/15 11:22 Analyzed 03/10/15 11:22 ple ID: 160-1	Dil Fa
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: tate Collected: 02/11	Result 0.115 0.0969 0.0389 %Yield 92.6 WAA-02-A /15 10:14 /15 09:30	Qualifier Qualifier Qualifier F-PS-201	Count Uncert. (2σ+/-) 0.142 0.108 0.0930 Limits 30 - 110	Uncert. (2σ+/-) 0.142 0.108	1.00	0.233 0.153	pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27 03/03/15 14:27 Prepared 03/03/15 14:27	03/10/15 11:22 03/10/15 11:22 03/10/15 11:22 Analyzed 03/10/15 11:22 ple ID: 160-1	Dil Fa 0545-2
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: ate Collected: 02/11 ate Received: 02/19	Result 0.115 0.0969 0.0389 %Yield 92.6 WAA-02-A /15 10:14 /15 09:30	Qualifier Qualifier Qualifier F-PS-201	Count Uncert. (2σ+/-) 0.142 0.108 0.0930 Limits 30 - 110	Uncert. (2σ+/-) 0.142 0.108	1.00	0.233 0.153	pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27 03/03/15 14:27 Prepared 03/03/15 14:27	03/10/15 11:22 03/10/15 11:22 03/10/15 11:22 Analyzed 03/10/15 11:22 ple ID: 160-1	Dil Fa 0545-2
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Ilient Sample ID: ate Collected: 02/11 ate Received: 02/19	Result 0.115 0.0969 0.0389 %Yield 92.6 WAA-02-A /15 10:14 /15 09:30	Qualifier Qualifier Qualifier F-PS-201	Count Uncert. (2σ+/-) 0.142 0.108 0.0930 Limits 30 - 110	Uncert. (2σ+/-) 0.142 0.108 0.0931	1.00	0.233 0.153	pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27 03/03/15 14:27 Prepared 03/03/15 14:27	03/10/15 11:22 03/10/15 11:22 03/10/15 11:22 Analyzed 03/10/15 11:22 ple ID: 160-1	Dil Fa 0545-2
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: ate Collected: 02/11 ate Received: 02/19 Method: 9315 - Tota	Result 0.115 0.0969 0.0389 %Yield 92.6 WAA-02-A /15 10:14 /15 09:30	Qualifier Qualifier F-PS-201 Im (GFPC) Qualifier	Count Uncert. (2σ+/-) 0.142 0.108 0.0930 Limits 30 - 110 50211 Count Uncert. (2σ+/-)	Uncert. (2σ+/-) 0.142 0.108 0.0931 Total Uncert. (2σ+/-)	1.00 1.00 1.00	0.233 0.153 0.181	pCi/Sample pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27 03/03/15 14:27 Prepared 03/03/15 14:27 Lab Sam	03/10/15 11:22 03/10/15 11:22 03/10/15 11:22 Analyzed 03/10/15 11:22 ple ID: 160-1 Matri	Dil Fa 0545-; x; Filte Dil Fa
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232	Result 0.115 0.0969 0.0389 %Yield 92.6 WAA-02-A /15 10:14 /15 09:30	Qualifier Qualifier F-PS-201 Im (GFPC) Qualifier	Count Uncert. (2σ+/-) 0.142 0.108 0.0930 Limits 30 - 110 50211 Count Uncert.	Uncert. (2σ+/-) 0.142 0.108 0.0931 Total Uncert.	1.00 1.00 1.00	0.233 0.153 0.181	pCi/Sample pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27 03/03/15 14:27 Prepared 03/03/15 14:27 Lab Sam	03/10/15 11:22 03/10/15 11:22 03/10/15 11:22 Analyzed 03/10/15 11:22 ple ID: 160-1 Matri	Dil Fa
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: ate Collected: 02/11 ate Received: 02/19 Method: 9315 - Tota	Result 0.115 0.0969 0.0389 %Yield 92.6 WAA-02-A /15 10:14 /15 09:30	Qualifier Qualifier F-PS-201 Im (GFPC) Qualifier	Count Uncert. (2σ+/-) 0.142 0.108 0.0930 Limits 30 - 110 50211 Count Uncert. (2σ+/-)	Uncert. (2σ+/-) 0.142 0.108 0.0931 Total Uncert. (2σ+/-)	1.00 1.00 1.00	0.233 0.153 0.181	pCi/Sample pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27 03/03/15 14:27 Prepared 03/03/15 14:27 Lab Sam	03/10/15 11:22 03/10/15 11:22 03/10/15 11:22 Analyzed 03/10/15 11:22 ple ID: 160-1 Matri	Dil Fa 0545-; x; Filte Dil Fa

Method: A-01-R - Iso	topic Thoriu	ım (Alpha S	Spectrometry)						
	•		Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.139	y	0.156	0.157	1.00	0.252	pCi/Sample	03/03/15 14:27	03/10/15 11:24	1
Thorium-230	0.162	7	0.119	0.120	1.00	0.135	pCi/Sample	03/03/15 14:27	03/10/15 11:24	1
Thorium-232	0.0760	u	0.0844	0.0846	1.00	0.120	pCi/Sample	03/03/15 14:27	03/10/15 11:24	1

HUE 24 April 2015

TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Client Sample ID: WAA-02-AF-PS-20150211

Date Collected: 02/11/15 10:14 Date Received: 02/19/15 09:30 Lab Sample ID: 160-10545-2

Matrix: Filter

Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	92 2		30 - 110					03/03/15 14:27	03/10/15 11:24	1
Method: A-01-R - Iso	otopic Uraniu	m (Alpha S	pectrometry))						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0727	W	0.118	0.119	1.00	0.209	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1
Uranium-235/236	-8-8-		0.0886	0.0887	1.00	0.174	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1
Uranium-238	0.101	U	0.105	0.105	1.00	0.153	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	88.8		30 - 110					03/03/15 14:27	03/10/15 11:22	- 1

Client Sample ID: WAA-03-AF-PS-20150211

Date Collected: 02/11/15 10:44

Date Received: 02/19/15 09:30

Lab Sample ID: 160-10545-3

Matrix: Filter

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL.	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium			0.396	0.397	(1.00)	0.697	pCi/Sample	03/02/15 09:17	03/05/15 18:12	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	103		40 - 110					03/02/15 09:17	03/05/15 18:12	1
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry	Í						
	3500	, , , , , , , , , , , , , , , , , , , ,	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.171	W	0.159	0.160	1.00	0.242	pCi/Sample	03/03/15 14:27	03/10/15 11:24	1
Thorium-230	0.222	7	0.137	0.138	1.00	0.137	pCi/Sample	03/03/15 14:27	03/10/15 11:24	1
Thorium-232	0.0658	W	0.0750	0.0752	1.00	0.101	pCi/Sample	03/03/15 14:27	03/10/15 11:24	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	93.3		30 - 110					03/03/15 14:27	03/10/15 11:24	1
Mathadi A 04 D. Jac	faula Huauk	(Almha S								
Method: A-01-R - Iso	topic Uranit	ım (Alpha S	Count) Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0970	W.	0.111	0.111	(1.0)	0.171	pCi/Sample	03/03/15 14:27	03/10/15 11 22	1
Uranium-235/236	0.0982	, 2	0.0982	0.0985	1.00	0.0736	pCi/Sample	03/03/15 14:27	03/10/15 11.22	1
Uranium-238	0.0541	4	0.0837	0.0838	1.09	0.145	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

HUG 20 Apr 15

TestAmerica St. Louis

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3/23/2015

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Lab Sample ID: 160-10545-4

Matrix: Filter

Client Sample ID: WAA-04-AF-PS-20150211

Date Collected: 02/11/15 10:58 Date Received: 02/19/15 09:30

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	-0.0619		0.347	0.348	1.00	0.695	pCi/Sample	03/02/15 09:17	03/05/15 18:39	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	93.8		40 - 110					03/02/15 09:17	03/05/15 18:39	1

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.148	uc _	0.166	0.167	1.00	0.266	pCi/Sample	03/03/15 14:27	03/10/15 11:24	1
Thorium-230	0.288	7	0.159	0.161	1.00	0.133	pCi/Sample	03/03/15 14:27	03/10/15 11:24	1
Thorium-232	0.0320	u	0.0596	0.0596	1.00	0.112	pCi/Sample	03/03/15 14:27	03/10/15 11:24	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	84.5		30 - 110					03/03/15 14:27	03/10/15 11:24	1

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.232	7	0.139	0.141	1.00	0.125	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1
Uranium-235/236	0.0138	W	0.0514	0.0514	1.00	0.131	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1
Uranium-238	0.0602	W	0.0793	0.0795	1.00	0.125	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	92.1		30 - 110					03/03/15 14:27	03/10/15 11:22	1

Client Sample ID: WAA-05-AF-PS-20150211

Date Collected: 02/11/15 10:30

Date Received: 02/19/15 09:30

Lab	Sample	ID:	160-10545-5	
			Matrix: Filter	

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.973	u	0.536	0.543	1.00	0.726	pCi/Sample	03/02/15 09:17	03/05/15 18:40	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	101		40 - 110					03/02/15 09:17	03/05/15 18:40	
Method: A-01-R - Iso	topic Thoriu	ım (Alpha S	pectrometry) Count	Total						
	•		Count Uncert.	Total Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Method: A-01-R - Iso Analyte Thorium-228	•	Qualifier	Count	Total	RL (1.00)	MDC 0.192	Unit pCi/Sample	Prepared 03/03/15 14:27	Analyzed 03/10/15 11:24	Dil Fac
Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	-	-				Dil Fa
Analyte Thorium-228	Result 0.164	Qualifier	Count Uncert. (2 <i>σ+l-</i>) 0.139	Total Uncert. (2σ+/-) 0.139	1.00	0.192	pCi/Sample	03/03/15 14:27	03/10/15 11:24	Dil Fac
Analyte Thorium-228 Thorium-230	Result 0.164 0.227	Qualifier U	Count Uncert. (2σ+/-) 0.139 0.147	Total Uncert. (2σ+/-) 0.139 0.148	1.00	0.192 0.164	pCi/Sample pCi/Sample	03/03/15 14:27 03/03/15 14:27	03/10/15 11:24 03/10/15 11:24	Dil Fac

HUE 20 Am 15

TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Client Sample ID: WAA-05-AF-PS-20150211

Date Collected: 02/11/15 10:30 Date Received: 02/19/15 09:30 Lab Sample ID: 160-10545-5

Matrix: Filter

			Count	Total							
			Uncert.	Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL		MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0403	61	0.0680	0.0681	1.00	1	0.122	pCi/Sample	03/03/15 14:27	03/11/15 09:14	1
Uranium-235/236	0.0231	W	0.0462	0.0463	1.00		0.0694	pCi/Sample	03/03/15 14:27	03/11/15 09:14	1
Uranium-238	0.0216		0.0568	0.0569	1.00		0.122	pCi/Sample	03/03/15 14:27	03/11/15 09:14	1
Tracer	%Yield	Qualifier	Limits						Prepared	Analyzed	Dil Fac
Uranium-232	94.4		30 - 110						03/03/15 14:27	03/11/15 09:14	

Client Sample ID: WAA-00-AF-FB-20150211

Date Collected: 02/11/15 00:00

Date Received: 02/19/15 09:30

Lab Sample ID: 160-10545-6

Matrix: Filter

Method: 9315 - Total	Apha Radiu	m (GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.644	J	0.419	0.423	1.00	0.599	pCi/Sample	03/02/15 09:17	03/05/15 18:40	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110					03/02/15 09:17	03/05/15 18:40	
Method: A-01-R - Isot	opic Thoriu	ım (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.0184	W	0.128	0.128	(1.00)	0.259	pCi/Sample	03/03/15 14:27	03/11/15 09:14	1
Thorium-230	0.272	7	0.151	0.153	1.00	0.127	pCi/Sample	03/03/15 14:27	03/11/15 09:14	
Thorium-232	0.0529	M	0.0819	0.0820	1.00	0.142	pCi/Sample	03/03/15 14:27	03/11/15 09:14	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	88.7		30 - 110					03/03/15 14:27	03/11/15 09:14	1
Method: A-01-R - Isot	opic Uraniı	ım (Alpha S	pectrometry)						
	AND BUILDING AND		Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0483	UY	0.0949	0.0950	1.00	0.177	pCi/Sample	03/03/15 14:27	03/10/15 11:22	-
Uranium-235/236	-0.0100	UG	0.0200	0.0200	1.00	0.133	pCi/Sample	03/03/15 14:27	03/10/15 11:22	. 1
Uranium-238	0.0883	u 4	0.0876	0.0880	1.00	0.106	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	89.6		30 - 110					03/03/15 14:27	03/10/15 11:22	7

HUE 20 Am 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Method: 9315 - Total Apha Radium (GFPC)

Lab Sample ID: MB 160-176803/1-A

Matrix: Filter

Analysis Batch: 177959

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 176803

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.1944	U	0.303	0.303	1.00	0.516	pCi/Sample	03/02/15 09:17	03/10/15 18:03	1

MB MB

Carrier **%Yield Qualifier** Limits Prepared Analyzed Dil Fac Ba Carrier 96.8 40 - 110 03/02/15 09:17 03/10/15 18:03

Client Sample ID: Lab Control Sample

Prep Type: Total/NA **Prep Batch: 176803**

Lab Sample ID: LCS 160-176803/2-A

Matrix: Filter

Analysis Batch: 177959

				Total					
	Spike	LCS	LCS	Uncert.					%Rec.
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits
Total Alpha	44.9	60.32		5.93	1.00	0.511	pCi/Samp	134	65 _ 150
Radium									

LCS LCS

%Yield Qualifier Carrier Ba Carrier 40 - 110 96.2

Lab Sample ID: LCSD 160-176803/3-A

Matrix: Filter

Analysis Batch: 177959

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

Prep Batch: 176803

				Total							
	Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Total Alpha	44.9	61.18		6.01	1.00	0.592	pCi/Samp	136	65 - 150	0.07	1

Radium

Thorium-229

LCSD LCSD Carrier %Yield Qualifier Limits Ba Carrier 94.4 40 - 110

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

92.9

Lab Sample ID: MB 160-177090/1-A Client Sample ID: Method Blank **Matrix: Filter** Prep Type: Total/NA

Analysis Batch: 178262 **Prep Batch: 177090**

Alialysis Datell. I	70202								i iep batcii.	177030
			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.03162	U	0.0959	0.0960	1.00	0.193	pCi/Sample	03/03/15 14:27	03/10/15 11:23	1
Thorium-230	0.3680		0.175	0.177	1.00	0.140	pCi/Sample	03/03/15 14:27	03/10/15 11:23	1
Thorium-232	0.006297	U	0.0620	0.0620	1.00	0.152	pCi/Sample	03/03/15 14:27	03/10/15 11:23	1
	MB	МВ								
Tracer	%Yield	Qualifier	l imits					Prenared	Analyzed	Dil Fac

30 - 110

TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

16.1

Lab Sample ID: LCS 160-177090/2-A

Matrix: Filter

Thorium-230

Analysis Batch: 178263

Client Sample ID: Lab Control Sample

%Rec.

Limits

81 - 118

Prep Type: Total/NA

Prep Batch: 177090

Total Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL MDC Unit %Rec

16.21

Result Qual

16 60

LCS LCS

Qualifier Tracer %Yield I imits Thorium-229 91.1 30 - 110

Client Sample ID: Lab Control Sample Dup

101

103

Prep Type: Total/NA

Prep Batch: 177090

Lab Sample ID: LCSD 160-177090/3-A

Matrix: Filter

Analyte

Thorium-230

Analysis Batch: 178265

LCSD LCSD Spike

Added

16.1

Total Uncert. $(2\sigma + / -)$ RL MDC Unit %Rec

0.177 pCi/Samp

0.104 pCi/Samr

1.00

1.00

1.76

1.79

RER %Rec. Limits RER

Limit 81 - 118 0.11

LCSD LCSD Tracer %Yield Qualifier Limits Thorium-229 90.6 30 - 110

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-177093/1-A

Matrix: Filter

Matrix: Filter

Analysis Batch: 178249

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 177093

			Count	iotai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.1680	U	0.135	0.135	1.00	0.179	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1
Uranium-235/236	0.03645	U	0.0679	0.0680	1.00	0.127	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1
Uranium-238	0.09540	U	0.0930	0.0934	1.00	0.121	pCi/Sample	03/03/15 14:27	03/10/15 11:22	1

MR MR %Yield

Lab Sample ID: LCS 160-177093/2-A

Qualifier Tracer Limits 30 - 110 Uranium-232 89.3

03/10/15 11:22 03/03/15 14:27

%Rec.

Limits

90

84 - 120

82 - 122

Analyzed

Client Sample ID: Lab Control Sample

Prepared

0.0579 pCi/Samp

Prep Type: Total/NA

Dil Fac

Prep Batch: 177093

Analysis Batch: 178250

Total Spike LCS LCS Uncert. Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Uranium-233/23 25.5 23.20 2.37 1.00 0.127 pCi/Samp 91

Uranium-238 26.0 23.44 2.38 1.00 LCS LCS

%Yield Qualifier Limits Tracer Uranium-232 91.3 30 - 110

TestAmerica St. Louis

QC Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Limits

30 - 110

Lab Sample ID: LCSD 160-177093/3-A

%Yield Qualifier

83.8

Matrix: Filter

Tracer

Uranium-232

Analysis Batch: 178252

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

Prep Batch: 177093

					Total							
		Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte		Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Uranium-233/23		25.5	24.88		2.52	1.00	0.111	pCi/Samp	98	84 - 120	0.34	1
4												
Uranium-238		26.0	24.46		2.49	1.00	0.162	pCi/Samp	94	82 _ 122	0.21	1
	LCSD LCSD											

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QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10545-1

Rad

Prep Batch: 176803

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10545-1	WAA-01-AF-PS-20150211	Total/NA	Filter	DPS-0	
160-10545-2	WAA-02-AF-PS-20150211	Total/NA	Filter	DPS-0	
160-10545-3	WAA-03-AF-PS-20150211	Total/NA	Filter	DPS-0	
160-10545-4	WAA-04-AF-PS-20150211	Total/NA	Filter	DPS-0	
160-10545-5	WAA-05-AF-PS-20150211	Total/NA	Filter	DPS-0	
160-10545-6	WAA-00-AF-FB-20150211	Total/NA	Filter	DPS-0	
LCS 160-176803/2-A	Lab Control Sample	Total/NA	Filter	DPS-0	
LCSD 160-176803/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0	
MB 160-176803/1-A	Method Blank	Total/NA	Filter	DPS-0	

Prep Batch: 177090

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10545-1	WAA-01-AF-PS-20150211	Total/NA	Filter	ExtChrom	
160-10545-2	WAA-02-AF-PS-20150211	Total/NA	Filter	ExtChrom	
160-10545-3	WAA-03-AF-PS-20150211	Total/NA	Filter	ExtChrom	
160-10545-4	WAA-04-AF-PS-20150211	Total/NA	Filter	ExtChrom	
160-10545-5	WAA-05-AF-PS-20150211	Total/NA	Filter	ExtChrom	
160-10545-6	WAA-00-AF-FB-20150211	Total/NA	Filter	ExtChrom	
LCS 160-177090/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-177090/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-177090/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 177093

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10545-1	WAA-01-AF-PS-20150211	Total/NA	Filter	ExtChrom	-
160-10545-2	WAA-02-AF-PS-20150211	Total/NA	Filter	ExtChrom	
160-10545-3	WAA-03-AF-PS-20150211	Total/NA	Filter	ExtChrom	
160-10545-4	WAA-04-AF-PS-20150211	Total/NA	Filter	ExtChrom	
160-10545-5	WAA-05-AF-PS-20150211	Total/NA	Filter	ExtChrom	
160-10545-6	WAA-00-AF-FB-20150211	Total/NA	Filter	ExtChrom	
LCS 160-177093/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-177093/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-177093/1-A	Method Blank	Total/NA	Filter	ExtChrom	

TestAmerica St. Louis

TestAmerica Job ID: 160-10545-1

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-10545-1	WAA-01-AF-PS-20150211	82.0	
160-10545-2	WAA-02-AF-PS-20150211	101	
160-10545-3	WAA-03-AF-PS-20150211	103	
160-10545-4	WAA-04-AF-PS-20150211	93.8	
160-10545-5	WAA-05-AF-PS-20150211	101	
160-10545-6	WAA-00-AF-FB-20150211	104	
LCS 160-176803/2-A	Lab Control Sample	96.2	
LCSD 160-176803/3-A	Lab Control Sample Dup	94.4	
MB 160-176803/1-A	Method Blank	96.8	
Tracer/Carrier Legend			
Ba = Ba Carrier			

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Th-229	
Lab Sample ID	Client Sample ID	(30-110)	
160-10545-1	WAA-01-AF-PS-20150211	91.0	
160-10545-2	WAA-02-AF-PS-20150211	92.2	
160-10545-3	WAA-03-AF-PS-20150211	93.3	
160-10545-4	WAA-04-AF-PS-20150211	84.5	
160-10545-5	WAA-05-AF-PS-20150211	90.4	
160-10545-6	WAA-00-AF-FB-20150211	88.7	
LCS 160-177090/2-A	Lab Control Sample	91.1	
LCSD 160-177090/3-A	Lab Control Sample Dup	90.6	
MB 160-177090/1-A	Method Blank	92.9	

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		U-232	
Lab Sample ID	Client Sample ID	(30-110)	
160-10545-1	WAA-01-AF-PS-20150211	92.6	
160-10545-2	WAA-02-AF-PS-20150211	88.8	
160-10545-3	WAA-03-AF-PS-20150211	87.5	
160-10545-4	WAA-04-AF-PS-20150211	92.1	
160-10545-5	WAA-05-AF-PS-20150211	94.4	
160-10545-6	WAA-00-AF-FB-20150211	89.6	
LCS 160-177093/2-A	Lab Control Sample	91.3	
_CSD 160-177093/3-A	Lab Control Sample Dup	83.8	
MB 160-177093/1-A	Method Blank	89.3	

U-232 = Uranium-232

TestAmerica St. Louis

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 20, 2015
Sample Delivery Group (SDG):	J10616
Sample Numbers:	WAA-01-AF-PS-20150218, WAA-02-AF-PS-20150218, WAA-03-AF-PS-20150218, WAA-04-AF-PS-20150218, WAA-05-AF-PS-20150218, and WAA-00-AF-FB-20150218
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
Packages from Subcontracted Laboratory Agency Radiological Interest and	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data addition criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10616 included five (5) environmental air (filter) samples and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and uranium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded low activities for one (of three) thorium isotopes and one (of three) uranium isotopes. The field blank yielded low activities for those two isotopes and one other uranium isotope. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10616-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Elizabeth M. Akurcheur

Authorized for release by: 3/24/2015 1:49:45 PM Elizabeth Hoerchler, Project Mgmt. Assistant elizabeth.hoerchler@testamericainc.com

Designee for Erika Gish, Project Manager II

(314)298-8566 erika.gish@testamericainc.com

----- LINKS ------

Review your project results through Total Access

Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10616-1

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10616-1

Job ID: 160-10616-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10616-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 02/23/2015; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 18.0° C.

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-01-AF-PS-20150218 (160-10616-1), WAA-02-AF-PS-20150218 (160-10616-2), WAA-03-AF-PS-20150218 (160-10616-3), WAA-04-AF-PS-20150218 (160-10616-4), WAA-05-AF-PS-20150218 (160-10616-5) and WAA-00-AF-FB-20150218 (160-10616-6) were analyzed for Total Alpha Radium (GFPC) in accordance with SW- 846 Method 9315. The samples were prepared on 03/03/2015 and analyzed on 03/06/2015.

Prep batch 176964

The following samples are filters that were split between multiple analyses: WAA-00-AF-FB-20150218 (160-10616-6), WAA-01-AF-PS-20150218 (160-10616-1), WAA-02-AF-PS-20150218 (160-10616-2), WAA-03-AF-PS-20150218 (160-10616-3), WAA-04-AF-PS-20150218 (160-10616-4), WAA-05-AF-PS-20150218 (160-10616-5). Insufficient sample volume was available to perform a sample duplicate (DUP). A LCS/LCSD was performed instead of a sample duplicate.

TestAmerica St. Louis 3/24/2015

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10616-1

Job ID: 160-10616-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150218 (160-10616-1), WAA-02-AF-PS-20150218 (160-10616-2), WAA-03-AF-PS-20150218 (160-10616-3), WAA-04-AF-PS-20150218 (160-10616-4), WAA-05-AF-PS-20150218 (160-10616-5) and WAA-00-AF-FB-20150218 (160-10616-6) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 03/03/2015 and analyzed on 03/11/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP) associated with batch 177088. The samples are filters that must be split between multiple analysis. A LCS/LCSD was performed instead of a sample duplicate. WAA-00-AF-FB-20150218 (160-10616-6), WAA-01-AF-PS-20150218 (160-10616-1), WAA-02-AF-PS-20150218 (160-10616-2), WAA-03-AF-PS-20150218 (160-10616-3), WAA-04-AF-PS-20150218 (160-10616-4), WAA-05-AF-PS-20150218 (160-10616-5)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150218 (160-10616-1), WAA-02-AF-PS-20150218 (160-10616-2), WAA-03-AF-PS-20150218 (160-10616-3), WAA-04-AF-PS-20150218 (160-10616-4), WAA-05-AF-PS-20150218 (160-10616-5) and WAA-00-AF-FB-20150218 (160-10616-6) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 03/03/2015 and analyzed on 03/11/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP) associated with batch 177089. The samples are filters that must be split between multiple analysis. A LCS/LCSD was performed instead of a sample duplicate. WAA-00-AF-FB-20150218 (160-10616-6), WAA-01-AF-PS-20150218 (160-10616-1), WAA-02-AF-PS-20150218 (160-10616-2), WAA-03-AF-PS-20150218 (160-10616-3), WAA-04-AF-PS-20150218 (160-10616-4), WAA-05-AF-PS-20150218 (160-10616-5)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

13715 Rider Trail North

Chain of Custody Record



Earth City, MO 63045 phone 314.298.8566 fax	Requ	latory Pro	gram: Г	Tow F	NPDES	٦	RCR	Δ	П	Other:										TestAmerica Laboratories	s. Inc.
Client Contact	Project Manager: Dave Kinroth				Site Contact: Dave Kinroth Date: 2-2							e: 2-2	2-23-15					OC No:	7		
Tetra Tech, Inc.	Tel/Fax: 314-517-6798										Carrier: NA					F	1 of 1 COCs	-			
415 Oak Street	Analysis Turnaround Time				Lab Contact: Wike I Taiks Cal						James, IVA				ТТ	- S	ampler:	-			
Kansas City, MO 64106	CALENDAR DAYS WORKING DAYS											I						-	or Lab Use Only:	-	
(816) 412-1786 Phone	TAT if different from Below20				2					10									Valk-in Client:	1	
(816) 816-410-1748 FAX	2 weeks				•		-		En CH	E 8	FI									ab Sampling:	
Project Name: West Lake Landfill Site			week				9310 Gross Alpha/Beta	Spec	9315 Total Alpha Radium	A-01-R (sotopic Thorium	* 9315 Radium-226 (GFPC)						1	11	STATE OF THE PARTY		-
Site: Bridgeton, MO	2 days						ha/	g r	la R	4	528									ob / SDG No.:	$\overline{}$
PO# 1105610	1 =		day			Filtered Sample (Y	₽	Gamm	함	old o	1 5								F	50 / 6DC 110	
			Sample			Sal	SSO	S	tal/	sot so	adi su		1		1	1 1			-		
	Sample	Sample	Type			ed a	Ö	GA-01-R	10	4 0	F 75				1	$ \ $					1
Sample Identification	Date	Time	(C=Comp, G=Grab)	Matrix	# of Cont.	ile i	310	A-C	315	5 6	3 5								Open Company	Comple Cresifie Netser	
Cample Identification	Dute	Title	0-01437	IVIALITA			- 0	0	0)	4 4	*		=	\vdash	+	\vdash	-	+		Sample Specific Notes:	
WAA-01-AF-PS-20150218	2/18/15	12:20	Filter	Air	1	Ш	X	Х	Х	x >	x x		\perp		\perp				*	9315 Radium-226 (GFPC)	
WAA-02-AF-PS-20150218	2/18/15	13:05	Filter	Air	1	Ш	X	Х	Х	X 2	x x								С	ontingent upon TAR results	
WAA-03-AF-PS-20150218	2/18/15	12:40	Filter	Air	1	Ш	X	Х	Х	x ;	x x								f	or all samples	
WAA-04-AF-PS-20150218	2/18/15	12:55	Filter	Air	1	Ш	X	Х	X	X ;	x x										
WAA-05-AF-PS-20150218	2/18/15	13:15	Filter	Air	1		х	Х	Х	X X	x x									*	
WAA-00-AF-FB-20150218	2/18/15	NA	Filter	Air	1		х	Х	Х	x :	хх			П							
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	-					H	+	+	-	┼┼			+	$\vdash \vdash$	+	- 1					
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																1	60-10	616 0	Chain	of Custody	
						П	Т		I		1.			П		1					
						П	T				\top					\Box	T				
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5	-NaOH; 6-	Other																			
Possible Hazard Identification:					27,000,000,000,000,000		Samp	ole D	Disp	osal (A fee	may	be a	sess	ed if	samp	les ar	e reta	ained	longer than 1 month)	The state of the s
Are any samples from a listed EPA Hazardous Waste? Please	List any EF	A Waste C	odes for the	e sample	e in the																
Comments Section if the lab is to dispose of the sample.						_											-				
✓Non-Hazard ☐Flammable ☐Skin Irritant	Poisor	В	Unkno	DWIT				Return	n to (Client			Dispos	al by La	b		Arc	hive for	r	Months	
Special Instructions/QC Requirements & Comments:																					
Custody Seals Intact: Yes No	Custody	Seal No :							Co	oler T	emp.	(°C): (Obs'd:		(Corr'd	:		Th	erm ID No.:	
			Date/T	ime:	Cooler Temp. (So					(-).	Company:							Date/Time:			
www bangon	Tetra Tech 2/23/15					040 Oll Clarke								TA ST						2-23-15 1040	è
Relinquished by:		Company:			Date/Time:			Received by:						Company:						Date/Time:	
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Relinquished by:	Company	r.		Date/T	ime:	F	Recei	ved	in L	abora	tory b	y:			Comp	any:			Į	Date/Time:	
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Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Job Number: 160-10616-1

Client: Tetra Tech EM Inc.

List Source: TestAmerica St. Louis Login Number: 10616

List Number: 1 Creator: Clarke, Jill C

Greator: Glarke, Jili C		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Quality Control

Relative error ratio

TestAmerica Job ID: 160-10616-1

Qualifiers

Rad

ND PQL

QC

RL

RER

RPD

TEF

TEQ

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
n n	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated

TestAmerica St. Louis

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10616-1

Method	Method Description	Protocol	Laboratory
9315	Total Apha Radium (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10616-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10616-1	WAA-01-AF-PS-20150218	Filter	02/18/15 12:20	02/23/15 10:40
160-10616-2	WAA-02-AF-PS-20150218	Filter	02/18/15 13:05	02/23/15 10:40
160-10616-3	WAA-03-AF-PS-20150218	Filter	02/18/15 12:40	02/23/15 10:40
160-10616-4	WAA-04-AF-PS-20150218	Filter	02/18/15 12:55	02/23/15 10:40
160-10616-5	WAA-05-AF-PS-20150218	Filter	02/18/15 13:15	02/23/15 10:40
160-10616-6	WAA-00-AF-FB-20150218	Filter	02/18/15 00:00	02/23/15 10:40

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11

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10616-1

Lab Sample ID: 160-10616-1

Matrix: Filter

Client Sample ID: WAA-01-AF-PS-20150218

Date Collected: 02/18/15 12:20 Date Received: 02/23/15 10:40

Method: 9315 - Total Apha Radium (GFPC) Count Total Uncert. Uncert. Result Qualifier Analyte $(2\sigma + /-)$ $(2\sigma + /-)$ MDC Unit Prepared Analyzed Dil Fac 1.00 Total Alpha Radium -0.139 W 0.386 0.386 0.779 pCi/Sample 03/03/15 11:45 03/06/15 07:30 Carrier **%Yield Qualifier** Limits Prepared Analyzed Dil Fac Ba Carrier 106 40 - 110 03/03/15 11:45 03/06/15 07:30

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) Count Total Uncert. Uncert. Analyte Result Qualifier $(2\sigma + /-)$ (20+/-) RL MDC Unit Prepared Analyzed Dil Fac Thorium-228 0.109 0.133 0.133 1.00 0.217 pCi/Sample 03/03/15 14:20 03/11/15 09:19 0.172 0.176 1.00 pCi/Sample 03/03/15 14:20 03/11/15 09:19 Thorium-230 0.394 0.101 0.0907 0.0911 03/03/15 14:20 03/11/15 09:19 1.00 pCi/Sample Thorium-232 0.102 1 Tracer %Yield Qualifier Limits Prepared Analyzed Dil Fac Thorium-229 96.6 30 - 110 03/03/15 14:20 03/11/15 09:19

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) Count Total Uncert. Uncert. Analyte Result Qualifier (20+/-) (20+/-) RL MDC Unit Prepared Analyzed Dil Fac Uranium-233/234 0.0898 0.139 0.140 1.00 0.242 pCi/Sample 03/03/15 14:20 03/11/15 09:16 -0.0314 64 Uranium-235/236 0.0866 0.0867 1.00 pCi/Sample 03/03/15 14:20 03/11/15 09:16 Uranium-238 -0.124 0.0998 0,100 1.00 0.285 pCi/Sample 03/03/15 14:20 03/11/15 09:16 Prepared Tracer %Yield Qualifier Limits Analyzed Dil Fac Uranium-232 88.7 30.110 03/03/15 14:20 03/11/15 09:16

Client Sample ID: WAA-02-AF-PS-20150218

Date Collected: 02/18/15 13:05 Date Received: 02/23/15 10:40

Lab Sample ID: 160-10616-2 Matrix: Filter

Method: 9315 - Total Apha Radium (GFPC) Total Count Uncert. Uncert. MDC Unit Result Qualifier (20+/-) RL Prepared Analyzed Dil Fac (2g+/-) Analyte 03/03/15 11:45 Total Alpha Radium -0.0648 W 0.346 0.346 1.00 0.700 pCi/Sample 03/06/15 07:30 Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac Ba Carrier 103 40 - 110 03/03/15 11 45 03/06/15 07:30

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) Count Total Uncert. Uncert. (20+/-) Result Qualifier (20+/-) RL MDC Unit Prepared Analyzed Dil Fac Analyte 1.00 03/03/15 14:20 0.255 0.179 0.180 0.245 pCi/Sample 03/11/15 09:19 Thorium-228 0.119 0.120 1.00 0.136 pCi/Sample 03/03/15 14:20 03/11/15 09:19 Thorium-230 0.161 0.0761 Thorium-232 0.0577 U/L 0.0760 1.00 0.120 pCi/Sample 03/03/15 14:20 03/11/15 09:19

20 April

TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10616-1

Lab Sample ID: 160-10616-2

Matrix: Filter

Client Sample ID: WAA-02-AF-PS-20150218

Date Collected: 02/18/15 13:05 Date Received: 02/23/15 10:40

Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	88.9	A seed in Property to below in the last on the	30 - 110					03/03/15 14:20	03/11/15 09.19	1
Method: A-01-R - Iso	topic Uraniu	ım (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.371	3	0.177	0.180	1.00	0.166	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
Uranium-235/236	0.0675	I	0.0780	0.0782	1.00	0.0675	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
Uranium-238	0.660	3	0.220	0.227	1.00	0.0998	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	95.1		30 - 110					03/03/15 14:20	03/11/15 09:16	1

Client Sample ID: WAA-03-AF-PS-20150218

%Yield Qualifier

91.6

Date Collected: 02/18/15 12:40

Date Received: 02/23/15 10:40

Tracer

Uranium-232

Lab Sample ID: 160-10616-3 Matrix: Filter

			Count Uncert.	Total						
Analyte	Result	Qualifier	(2σ+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.563		0,414	0.417	(1.00)	0.602	pCi/Sample	03/03/15 11:45	03/06/15 07:30	1
Total Alpha Nadidili	0.000	4	0.414	0.417		0.002	poroampic	00/00/10 11.40	00/00/10 07:00	,
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110					03/03/15 11:45	03/06/15 07:30	1
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry))						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.122	al	0.158	0.158	1.00	0.263	pCi/Sample	03/03/15 14:20	03/11/15 09:19	1
Thorium-230	0.315	, 7	0.157	0.159	1.00	0.120	pCi/Sample	03/03/15 14:20	03/11/15 09:19	1
Thorium-232	0.0472	w	0.0652	0.0653	000	0.101	pCi/Sample	03/03/15 14:20	03/11/15 09:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	90.6		30 - 110					03/03/15 14:20	03/11/15 09 19	1
Method: A-01-R - Iso	topic Uraniı	ım (Alpha S	Spectrometry)						
	2		Count	Total						
			Uncert.	Uncert.						
Analyte	Resuit	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.245	7	0.155	0.157	1.00	0.181	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
Uranium-235/236	0.130	7	0.116	0.116	1.00	0.129	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
Uranium-238	0.238	3	0.142	0.144	1.00	0.138	pCi/Sample	03/03/15 14 20	03/11/15 09:16	1

HUG 29 Apr 15

30 - 110

Analyzed

03/03/15 14 20 03/11/15 09 16

Prepared

Dil Fac

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10616-1

Lab Sample ID: 160-10616-4

Matrix: Filter

Client Sample ID: WAA-04-AF-PS-20150218

Date Collected: 02/18/15 12:55 Date Received: 02/23/15 10:40

Method: 9315 - Total Apha Radium (GFPC) Count Total Uncert. Uncert. Analyte Result Qualifier $(2\sigma + /-)$ $(2\sigma + /-)$ RL MDC Unit Prepared Analyzed Dil Fac 0.395 1.00 03/03/15 11:45 03/06/15 07:30 **Total Alpha Radium** 0.578 0.399 0.551 pCi/Sample Carrier %Yield Qualifier Limits Prepared Dil Fac Analyzed

104 40 - 110 03/03/15 11:45 03/06/15 07:30 Ba Carrier

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) Count Total Uncert. Uncert. Analyte Result Qualifier $(2\sigma + /-)$ $(2\sigma + /-)$ MDC Unit Prepared Analyzed Dil Fac 1.00 Thorium-228 0.178 0.154 0.155 0.225 pCi/Sample 03/03/15 14:20 03/11/15 09:19 0.203 1.00 Thorium-230 0.500 0.207 0.160 pCi/Sample 03/03/15 14:20 03/11/15 09:19 0.0586 0.0587 1.00 Thorium-232 0.0139 0.136 pCi/Sample 03/03/15 14:20 03/11/15 09:19 %Yield Qualifier Limits Prepared Analyzed Dil Fac Thorium-229 93.9 30 - 110 03/03/15 14:20 03/11/15 09:19

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) Count Total Uncert. Uncert. Dil Fac Result Qualifier (20+/-) (20+/-) RL **MDC** Unit Prepared Analyte Analyzed Uranium-233/234 0.0969 0.0945 0.0948 1.00 0.123 pCi/Sample 03/03/15 14:20 03/11/15 09:16 0.0505 0.0506 1.00 pCi/Sample 03/03/15 14:20 03/11/15 09:16 Uranium-235/236 0.0136 0.129 1 0.0935 0.0837 0.0840 1.00 0.0561 pCi/Sample 03/03/15 14:20 03/11/15 09:16 1 Uranium-238 Dil Fac Tracer **%Yield Qualifier** Limits Prepared Analyzed Uranium-232 30 - 110 03/03/15 14:20 03/11/15 09:16 92.3

Client Sample ID: WAA-05-AF-PS-20150218

Date Collected: 02/18/15 13:15

Tracer

Thorium-229

Lab Sample ID: 160-10616-5 Matrix: Filter Date Received: 02/23/15 10:40

Method: 9315 - Total Apha Radium (GFPC) Count Total Uncert. Uncert. Result Qualifier $(2\sigma + / -)$ $(2\sigma + /-)$ RL MDC Unit Prepared Analyzed Dil Fac Analyte 03/03/15 11:45 03/06/15 07:31 0.0970 0.440 1.00 0.802 pCi/Sample Total Alpha Radium 0.440 %Yield Qualifier Limits Prepared Analyzed Dil Fac Carrier 03/03/15 11:45 40 - 110 03/06/15 07:31 Ba Carrier 104 Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) Count Total Uncert. Uncert. Result Qualifier (20+/-) RL MDC Unit Prepared Analyzed Dil Fac Analyte (2g+/-) 0.145 1.00 03/03/15 14:20 03/11/15 09 19 0.145 pCi/Sample 0.196 0.187 Thorium-228 0.186 0.189 1.00 pCi/Sample 03/03/15 14:20 03/11/15 09:19 Thorium-230 0.382 -0.00917 0.0640 0.0640 1.00 0.169 pCi/Sample 03/03/15 14:20 03/11/15 09:19 Thorium-232

14U E

Limits

30 - 110

%Yield Qualifier

89.7

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TestAmerica St. Louis

Analyzed

03/11/15 09 19

Prepared

03/03/15 14:20

Dil Fac

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10616-1

Client Sample ID: WAA-05-AF-PS-20150218

Date Collected: 02/18/15 13:15 Date Received: 02/23/15 10:40 Lab Sample ID: 160-10616-5

Matrix: Filter

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Uranium-233/234	0.0968	W	0.110	0.111	1.00	0.170	pCi/Sample	03/03/15 14:20	03/11/15 09:16	
Uranium-235/236	-0.0102	W	0.0204	0.0204	1.00	0.135	pCi/Sample	03/03/15 14:20	03/11/15 09 16	
Uranium-238	0.00655	B	0.0645	0.0645	1.00	0.158	pCi/Sample	03/03/15 14:20	03/11/15 09:16	
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Uranium-232	85.8		30 - 110					03/03/15 14:20	03/11/15 09:16	

Client Sample ID: WAA-00-AF-FB-20150218

Date Collected: 02/18/15 00:00

Date Received: 02/23/15 10:40

Lab Sample ID: 160-10616-6

Matrix: Filter

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.189	U	0.421	0.421	1.00	0.743	pCi/Sample	03/03/15 11:45	03/06/15 07:31	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110					03/03/15 11:45	03/06/15 07:31	1
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.153	EL.	0.145	0.145	1.00	0.215	pCi/Sample	03/03/15 14:20	03/11/15 09:19	1
Thorium-230	0.412	5	0.180	0.183	1.00	0.0586	pCi/Sample	03/03/15 14:20	03/11/15 09:19	1
Thorium-232	0.0389	U	0.0550	0.0551	1.00	0.0583	pCi/Sample	03/03/15 14:20	03/11/15 09:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	90.4		30 - 110					03/03/15 14:20	03/11/15 09:19	1
Method: A-01-R - Iso	topic Uraniu	ım (Alpha S	pectrometry)						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.220	7	0.142	0.143	1.00	0.160	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
Uranium-235/236	0.0172	u	0.0729	0.0729	1.00	0.169	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
Uranium-238	0.132	3	0.106	0.107	1.00	0.121	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
										Acres and Artist Control



Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10616-1

Method: 9315 - Total Apha Radium (GFPC)

Lab Sample ID: MB 160-176964/1-A

Lab Sample ID: LCS 160-176964/2-A

Matrix: Filter

Analysis Batch: 177607

Client Sample ID: Method Blank

Prep Type: Total/NA **Prep Batch: 176964**

Analyzed

03/06/15 07:30

Result Qualifier Dil Fac (2σ+/-) (2σ+/-) RL MDC Unit Prepared Analyte Analyzed -0.1507 Ū 0.366 1.00 0.757 pCi/Sample 03/03/15 11:45 03/06/15 07:30 Total Alpha Radium 0.366

Total

Uncert.

Count

Uncert.

44.9

43 11

MΒ MB

мв мв

Qualifier Carrier %Yield I imits 40 - 110 Ba Carrier 95.9

Client Sample ID: Lab Control Sample

65 - 150

Prepared

03/03/15 11:45

0.831 pCi/Samp

Prep Type: Total/NA

Prep Batch: 176964

Analysis Batch: 177607 Total LCS LCS Spike Uncert. %Rec. Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits

4.62

1.00

Total Alpha Radium

Matrix: Filter

LCS LCS

%Yield Qualifier Limits Carrier Ba Carrier 40 - 110 97.6

Lab Sample ID: LCSD 160-176964/3-A Client Sample ID: Lab Control Sample Dup

Matrix: Filter

Analysis Batch: 177607

Prep Type: Total/NA

96

Prep Batch: 176964

Total Spike LCSD LCSD Uncert. %Rec. RER Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits RER Limit 44.9 40.43 4.39 1.00 0.755 pCi/Samp Total Alpha

Radium

LCSD LCSD

Carrier %Yield Qualifier Limits Ba Carrier 97.1 40 - 110

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-177088/1-A

Matrix: Filter

Analysis Batch: 178821

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 177088

			Count	i otai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.1412	U	0.159	0.160	1.00	0.257	pCi/Sample	03/03/15 14:20	03/11/15 09:18	1
Thorium-230	0.2272		0.140	0.141	1.00	0.138	pCi/Sample	03/03/15 14:20	03/11/15 09:18	1
Thorium-232	0.06236	U	0.0771	0.0773	1.00	0.115	pCi/Sample	03/03/15 14:20	03/11/15 09:18	1
	Thorium-228 Thorium-230	Analyte Result Thorium-228 0.1412 Thorium-230 0.2272	Thorium-228 0.1412 U Thorium-230 0.2272	MB MB Uncert. Analyte Result Qualifier (2σ+/-) Thorium-228 0.1412 U 0.159 Thorium-230 0.2272 0.140	MB Analyte MB Result Result Thorium-228 0.1412 U Cort. (2σ+/-) (2σ+	MB Analyte Result Thorium-228 Qualifier (2σ+/-) (2σ+/-) RL (2σ+/-) Thorium-230 0.2272 0.140 0.141 1.00	MB Analyte Result Thorium-228 Qualifier (2σ+/-) (2σ+/-) RL (2σ+/-) MDC (2σ+/-) Thorium-230 0.2272 0.140 0.141 1.00 0.138	MB Analyte Result Thorium-228 Qualifier (2σ+/-) (2σ+/-) RL (2σ+/-) MDC (2σ+/-) Unit (2σ+/-) Thorium-230 0.1412 U 0.159 0.160 1.00 0.257 pCi/Sample Thorium-230 0.2272 0.140 0.141 1.00 0.138 pCi/Sample	Analyte Result Thorium-228 Qualifier (2σ+/-) (2σ+/-) RL (2σ+/-) MDC (2σ+/-) Unit Prepared Prepared Thorium-230 0.2272 0.140 0.141 1.00 0.257 pCi/Sample 03/03/15 14:20	Analyte Result Thorium-228 Qualifier (2σ+/-) (2σ+/-) RL (2σ+/-) MDC (2σ+/-) Prepared Divisor Analyzed Divisor Thorium-230 0.1412 U 0.159 0.160 1.00 0.257 pCi/Sample pCi/Sample Divisor 03/03/15 14:20 03/11/15 09:18

MB MB

Tracer %Yield Qualifier Limits Thorium-229 91.6 30 - 110 Prepared Analyzed

Dil Fac 03/03/15 14:20 03/11/15 09:18

TestAmerica St. Louis

Dil Fac

TestAmerica Job ID: 160-10616-1

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-177088/2-A **Client Sample ID: Lab Control Sample Matrix: Filter** Prep Type: Total/NA Prep Batch: 177088

Analysis Batch: 178822

				Total						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Thorium-230	16.1	16.36		1.77	1.00	0.173	pCi/Samp	102	81 - 118	

LCS LCS Tracer %Yield Qualifier Limits Thorium-229 90.5 30 - 110

Analysis Batch: 178823

Lab Sample ID: LCSD 160-177088/3-A	Client Sample ID: Lab Control Sample Dup
Matrix: Filter	Prep Type: Total/NA

Prep Batch: 177088 Total LCSD LCSD %Rec. RER Spike Uncert. (2σ+/-) Analyte Added Result Qual RL MDC Unit %Rec Limits RER Limit Thorium-230 16.1 17.18 1.00 0.101 pCi/Samp 107 81 - 118 1.83 0.23

LCSD LCSD Tracer %Yield Qualifier Limits Thorium-229 93.8 30 - 110

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-177089/1-A Client Sample ID: Method Blank **Matrix: Filter** Prep Type: Total/NA

Analysis Batch: 178809

			Count	Total					-	
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.09688		0.0867	0.0870	1.00	0.0581	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
Uranium-235/236	-0.04019	U	0.0402	0.0403	1.00	0.194	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
Uranium-238	0.04190	U	0.0708	0.0708	1.00	0.127	pCi/Sample	03/03/15 14:20	03/11/15 09:16	1
	MP	MR								

Qualifier Limits Prepared Tracer %Yield Analyzed Dil Fac 30 - 110 03/03/15 14:20 03/11/15 09:16 Uranium-232 89 4

Analysis Batch: 178811

ab Sample ID: LCS 160-177089/2-A	Client Sample ID: Lab Control Sample
latrix: Filter	Prep Type: Total/NA

Total LCS LCS Spike Uncert. %Rec. Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits Uranium-233/23 25.5 25.11 2.54 1.00 0.217 pCi/Samp 99 84 - 120 Uranium-238 26.0 24.81 2.51 1.00 0.146 pCi/Samp 95 82 - 122

	LCS	LCS	
Tracer	%Yield	Qualifier	Limits
Uranium-232	88.6		30 - 110

TestAmerica St. Louis

Prep Batch: 177089

Prep Batch: 177089

QC Sample Results

Client: Tetra Tech EM Inc.

Matrix: Filter

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCSD 160-177089/3-A

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

TestAmerica Job ID: 160-10616-1

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA
Prep Batch: 17708

Analysis Batch	า: 178812										Prep B	Batch: 1	77089
						Total							
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Uranium-233/23		_	25.5	24.60		2.52	1.00	0.156	pCi/Samp	97	84 - 120	0.10	1
4													
Uranium-238			26.0	25.78		2.62	1.00	0.139	pCi/Samp	99	82 - 122	0.19	1
	LCSD	LCSD											
Tracer	%Yield	Qualifier	Limits										
Uranium-232	80.5		30 - 110										

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10616-1

Rad

Prep Batch: 176964

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10616-1	WAA-01-AF-PS-20150218	Total/NA	Filter	DPS-0	
160-10616-2	WAA-02-AF-PS-20150218	Total/NA	Filter	DPS-0	
160-10616-3	WAA-03-AF-PS-20150218	Total/NA	Filter	DPS-0	
160-10616-4	WAA-04-AF-PS-20150218	Total/NA	Filter	DPS-0	
160-10616-5	WAA-05-AF-PS-20150218	Total/NA	Filter	DPS-0	
160-10616-6	WAA-00-AF-FB-20150218	Total/NA	Filter	DPS-0	
LCS 160-176964/2-A	Lab Control Sample	Total/NA	Filter	DPS-0	
LCSD 160-176964/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0	
MB 160-176964/1-A	Method Blank	Total/NA	Filter	DPS-0	

Prep Batch: 177088

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10616-1	WAA-01-AF-PS-20150218	Total/NA	Filter	ExtChrom	
160-10616-2	WAA-02-AF-PS-20150218	Total/NA	Filter	ExtChrom	
160-10616-3	WAA-03-AF-PS-20150218	Total/NA	Filter	ExtChrom	
160-10616-4	WAA-04-AF-PS-20150218	Total/NA	Filter	ExtChrom	
160-10616-5	WAA-05-AF-PS-20150218	Total/NA	Filter	ExtChrom	
160-10616-6	WAA-00-AF-FB-20150218	Total/NA	Filter	ExtChrom	
LCS 160-177088/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-177088/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-177088/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 177089

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10616-1	WAA-01-AF-PS-20150218	Total/NA	Filter	ExtChrom	-
160-10616-2	WAA-02-AF-PS-20150218	Total/NA	Filter	ExtChrom	
160-10616-3	WAA-03-AF-PS-20150218	Total/NA	Filter	ExtChrom	
160-10616-4	WAA-04-AF-PS-20150218	Total/NA	Filter	ExtChrom	
160-10616-5	WAA-05-AF-PS-20150218	Total/NA	Filter	ExtChrom	
160-10616-6	WAA-00-AF-FB-20150218	Total/NA	Filter	ExtChrom	
LCS 160-177089/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-177089/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-177089/1-A	Method Blank	Total/NA	Filter	ExtChrom	

TestAmerica St. Louis

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TestAmerica Job ID: 160-10616-1

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-10616-1	WAA-01-AF-PS-20150218	106	
160-10616-2	WAA-02-AF-PS-20150218	103	
160-10616-3	WAA-03-AF-PS-20150218	104	
160-10616-4	WAA-04-AF-PS-20150218	104	
160-10616-5	WAA-05-AF-PS-20150218	104	
160-10616-6	WAA-00-AF-FB-20150218	104	
LCS 160-176964/2-A	Lab Control Sample	97.6	
LCSD 160-176964/3-A	Lab Control Sample Dup	97.1	
MB 160-176964/1-A	Method Blank	95.9	
Tracer/Carrier Legend			

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Th-229	
Lab Sample ID	Client Sample ID	(30-110)	
160-10616-1	WAA-01-AF-PS-20150218	96.6	
160-10616-2	WAA-02-AF-PS-20150218	88.9	
160-10616-3	WAA-03-AF-PS-20150218	90.6	
160-10616-4	WAA-04-AF-PS-20150218	93.9	
160-10616-5	WAA-05-AF-PS-20150218	89.7	
160-10616-6	WAA-00-AF-FB-20150218	90.4	
LCS 160-177088/2-A	Lab Control Sample	90.5	
LCSD 160-177088/3-A	Lab Control Sample Dup	93.8	
MB 160-177088/1-A	Method Blank	91.6	
Tracer/Carrier Legend			

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		U-232	
Lab Sample ID	Client Sample ID	(30-110)	
160-10616-1	WAA-01-AF-PS-20150218	88.7	
160-10616-2	WAA-02-AF-PS-20150218	95.1	
160-10616-3	WAA-03-AF-PS-20150218	91.6	
160-10616-4	WAA-04-AF-PS-20150218	92.3	
160-10616-5	WAA-05-AF-PS-20150218	85.8	
160-10616-6	WAA-00-AF-FB-20150218	92.1	
_CS 160-177089/2-A	Lab Control Sample	88.6	
LCSD 160-177089/3-A	Lab Control Sample Dup	80.5	
MB 160-177089/1-A	Method Blank	89.4	

TestAmerica St. Louis

Page 18 of 18

3/24/2015

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 20, 2015
Sample Delivery Group (SDG):	J10707
Sample Numbers:	WAA-01-AF-PS-20150225, WAA-02-AF-PS-20150225, WAA-03-AF-PS-20150225, WAA-04-AF-PS-20150225, WAA-05-AF-PS-20150225, and WAA-00-AF-FB-20150225
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
Packages from Subcontracted Laboratory Agency Radiological Interest and	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10707 included five (5) environmental air (filter) samples and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and uranium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded low activities for one (of three) thorium isotopes and for none (of three) uranium isotopes. The field blank yielded low activities for that isotope and one uranium isotope. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J"). In the total alpha radium analysis, low sample volumes and high background counts led to some samples (including all laboratory QC samples) yielding minimum detectable concentrations above the reporting limit. No qualifications were applied for this, but data users should note that these results are not fully comparable with those from other sampling events.

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10707-2

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher



Authorized for release by: 3/31/2015 11:30:35 AM

Erika Gish, Project Manager II (314)298-8566

erika.gish@testamericainc.com

·····LINKS ······

Review your project results through
Total Access

Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10707-2

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Job ID: 160-10707-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10707-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 3/2/2015 10:35 AM; the samples arrived in good condition, properly preserved. The temperature of the cooler at receipt was 18.0° C.

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-01-AF-PS-20150225 (160-10707-1), WAA-02-AF-PS-20150225 (160-10707-2), WAA-03-AF-PS-20150225 (160-10707-3), WAA-04-AF-PS-20150225 (160-10707-4), WAA-05-AF-PS-20150225 (160-10707-5) and WAA-00-AF-FB-20150225 (160-10707-6) were analyzed for Total Alpha Radium (GFPC) in accordance with SW- 846 Method 9315. The samples were prepared on 03/11/2015 and analyzed on 03/12/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

The detection goal was not met for the following samples due to a reduced aliquot which can be attributed to the matrix of the sample (filter): (MB 160-178637/1-A), WAA-02-AF-PS-20150225 (160-10707-2). Samples are filters that were digested in order to split between

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Job ID: 160-10707-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

multiple analyses. Analytical results are reported with the detection limit achieved.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150225 (160-10707-1), WAA-02-AF-PS-20150225 (160-10707-2), WAA-03-AF-PS-20150225 (160-10707-3), WAA-04-AF-PS-20150225 (160-10707-4), WAA-05-AF-PS-20150225 (160-10707-5) and WAA-00-AF-FB-20150225 (160-10707-6) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 03/09/2015 and analyzed on 03/16/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150225 (160-10707-1), WAA-02-AF-PS-20150225 (160-10707-2), WAA-03-AF-PS-20150225 (160-10707-3), WAA-04-AF-PS-20150225 (160-10707-4), WAA-05-AF-PS-20150225 (160-10707-5) and WAA-00-AF-B-20150225 (160-10707-6) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 03/09/2015 and analyzed on 03/16/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

Chain of Custody Record

<u>TestAmerico</u>

13715 Rider Trail North

Earth City, MO 63045 Regulatory Program: DW NPDES phone 314.298.8566 fax RCRA Other: TestAmerica Laboratories, Inc. Client Contact Project Manager: Dave Kinroth Site Contact: Dave Kinroth Date: 3-2-15 COC No: Tel/Fax: 314-517-6798 Tetra Tech. Inc. Lab Contact: Mike Franks Carrier: NA COCs 415 Oak Street **Analysis Turnaround Time** Sampler: Kansas City, MO 64106 CALENDAR DAYS WORKING DAYS For Lab Use Only: (816) 412-1786 Phone Walk-in Client: Radium-226 (GFPC) TAT if different from Below 9315 Total Alpha Radium (816) 816-410-1748 FAX Uranium Lab Sampling: 2 weeks 9310 Gross Alpha/Beta Project Name: West Lake Landfill Site 1 week Site: Bridgeton, MO Job / SDG No .: 2 days PO# 1105610 1 day Sample GA-01-R (A-01-R | Type Sample Sample # of (C=Comp, Sample Identification Date Time G=Grab) Matrix Cont Sample Specific Notes: 2/25/15 X Х Х X WAA-01-AF-PS-20150225 11:06 Filter Air 9315 Radium-226 (GFPC) contingent upon TAR results 2/25/15 10:18 X Х X X Filter Air WAA-02-AF-PS-20150225 for all samples 2/25/15 X XX X 10:42 Air WAA-03-AF-PS-20150225 Filter 2/25/15 X XX X WAA-04-AF-PS-20150225 10:53 Filter Air 2/25/15 10:30 X X X X WAA-05-AF-PS-20150225 Filter Air 1 2/25/15 X WAA-00-AF-FB-20150225 NA Filter Air X X X Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Possible Hazard Identification: Sample Disposal (A fee may be assessed if samples are retained longer the Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. Unknown Archive for_ ✓ Non-Hazard ☐ Hammable Poison B Return to Client Disposal by Lab Months Special Instructions/QC Requirements & Comments: Corr'd: Therm ID No.; Cooler Temp. (°C): Obs'd: Custody Seal No.: Custody Seals Intact: Yes ☐ No Company: Date Time Date/Time: Received by: Relinquished by-Boulson Company: Tech 1035 2/3/18 Tetra 15 Hours Relinguished by: Date/Time: Received by: Company: Date/Time: Company: Relinquished by: Date/Time: Received in Laboratory by: Company: Date/Time: Company:

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Client: Tetra Tech EM Inc. Job Number: 160-10707-2

List Source: TestAmerica St. Louis

Login Number: 10707 List Number: 1 Creator: Clarke, Jill C

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica St. Louis

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Qualifiers

•	2	М
•	а	u

ND

PQL

QC

RER

RPD

TEF

TEQ

RL

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.
G	The Sample MDC is greater than the requested RL.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ΛL	Minimum Level (Dioxin)
NC	Not Calculated

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)
Toxicity Equivalent Quotient (Dioxin)

Quality Control

Relative error ratio

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Method	Method Description	Protocol	Laboratory
9315	Total Apha Radium (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10707-1	WAA-01-AF-PS-20150225	Filter	02/25/15 11:06	03/02/15 10:35
160-10707-2	WAA-02-AF-PS-20150225	Filter	02/25/15 10:18	03/02/15 10:35
160-10707-3	WAA-03-AF-PS-20150225	Filter	02/25/15 10:42	03/02/15 10:35
160-10707-4	WAA-04-AF-PS-20150225	Filter	02/25/15 10:53	03/02/15 10:35
160-10707-5	WAA-05-AF-PS-20150225	Filter	02/25/15 10:30	03/02/15 10:35
160-10707-6	WAA-00-AF-FB-20150225	Filter	02/25/15 00:00	03/02/15 10:35

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Lab Sample ID: 160-10707-1

Sample 15. 100-10101-1

Matrix: Filter

The second secon	
Client Sample ID: V	VAA-01-AF-PS-20150225

Method: 9315 - Total Apha Radium (GFPC)

Date Received: 02/25/15 11:06 Date Received: 03/02/15 10:35

			Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.480	U	0.586	0.587	1.00	0.969	pCi/Sample	03/11/15 11:29	03/12/15 18:40	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	106		40 - 110					03/11/15 11:29	03/12/15 18:40	1
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry)							
		,	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.162	W	0.144	0.145	1.00	0.212	pCi/Sample	03/09/15 14:16	03/16/15 20:10	1
Thorium-230	0.133	W	0.112	0.113	1.00	0.145	pCi/Sample	03/09/15 14:16	03/16/15 20:10	1
Thorium-232	0.0179	w I	0.0358	0.0359	1.00	0.0538	pCi/Sample	03/09/15 14:16	03/16/15 20:10	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	95.3		30 - 110					03/09/15 14:16	03/16/15 20.10	1
Method: A-01-R - Iso	topic Uranit	ım (Alpha S	pectrometry)							
	•	•	Count	Total						
			Uncert.	Uncert.						
			(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Analyte	Result	Qualifier	(20+1-)	(,						
Analyte Uranium-233/234	0.0668		0.0837	0.0839	1.00	0.131	pCi/Sample	03/09/15 14:16	03/16/15 20:13	1
		4			1.00	0.131 0.0665	pCi/Sample pCi/Sample	03/09/15 14:16 03/09/15 14:16	03/16/15 20:13 03/16/15 20:13	
Uranium-233/234	0.0668	4	0.0837	0.0839	/					1
Uranium-233/234 Uranium-235/236	0.0668 0.0222	y	0.0837 0.0443	0.0839 0.0444	1.00	0.0665	pCi/Sample	03/09/15 14:16	03/16/15 20:13	1 1 Dil Fac

Client Sample ID: WAA-02-AF-PS-20150225

Date Collected: 02/25/15 10:18

Date Received: 03/02/15 10:35

Lab Sample ID: 160-10707-2

Matrix: Filter

			Count Uncert.	Total Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL.	MDC Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	-0.0708	VA	0.600	0.600	1.00	1.14 pCi/Sample	03/11/15 11:29	03/12/15 18:40	1
Carrier	%Yield	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Ba Carrier	103		40 - 110				03/11/15 11.29	03/12/15 18 40	1
Method: A-01-R - Iso	otopic Thoriu	m (Alpha S	pectrometry)						
Method: A-01-R - Iso	otopic Thoriu	m (Alpha S	pectrometry) Count	Total					
Method: A-01-R - Iso	otopic Thoriu	m (Alpha S							
Method: A-01-R - Iso	•	m (Alpha S Qualifier	Count	Total	RL	MDC Unit	Prepared	Analyzed	Dil Fac
	•	Qualifier	Count Uncert.	Total Uncert.	RL 1.00	MDC Unit 0,258 pCi/Sample	Prepared 03/09/15 14:16	Analyzed 03/16/15 20 10	Dil Fac
	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	-	ALL MARKET DESIGNATION			Dil Fac

HVE 20 April 2015

TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Client Sample ID: WAA-02-AF-PS-20150225

Date Collected: 02/25/15 10:18

Lab Sample ID: 160-10707-2

Matrix: Filter

Date Received: 03/02/15 10:35

Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	91.4		30 - 110					03/09/15 14:16	03/16/15 20:10	1
Method: A-01-R - Is	otopic Uraniu	m (Alpha Sp	ectrometry)						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.144	7	0.108	0.109	1.00	0.105	pCi/Sample	03/09/15 14:16	03/16/15 20:13	1
Uranium-235/236	-0.00981	u	0.0196	0.0196	1.00	0.130	pCi/Sample	03/09/15 14:16	03/16/15 20:13	1
Uranium-238	0.105	7	0.0939	0.0943	1.00	0.104	pCi/Sample	03/09/15 14:16	03/16/15 20:13	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	93.2		30 - 110					03/09/15 14:16	03/16/15 20:13	1

Client Sample ID: WAA-03-AF-PS-20150225

Date Collected: 02/25/15 10:42

Date Received: 03/02/15 10:35

Lab Sample ID: 160-10707-3

Matrix: Filter

Method: 9315 - Total	Apria Radio	(0. 1 0)		T-4-1						
			Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(2σ+/-)	(2σ+/-)	RL		Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.372	W	0.485	0.487	1.00	0.811	pCi/Sample	03/11/15 11:29	03/12/15 18:49	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Ba Carrier	106		40 - 110					03/11/15 11:29	03/12/15 18:49	
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry)	í						
		- 1200 To 1200 To 1200 To 1200	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.0375	6	0.131	0.131	(1.00)	0.252	pCi/Sample	03/09/15 14:16	03/16/15 20:10	
Thorium-230	0.342	J	0.159	0,162	1.00	0.0996	pCi/Sample	03/09/15 14:16	03/16/15 20:10	
Thorium-232	0.203	3	0.133	0.134	1.00	0.144	pCi/Sample	03/09/15 14:16	03/16/15 20:10	
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Thorium-229	97.8		30 - 110					03/09/15 14:16	03/16/15 20:10	
Method: A-01-R - Iso	otonic Uranii	ım (Alnha S	nectrometry	í						
	ropio oranio	(,)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.123	y	0.107	0.107	1.00	0.135	pCi/Sample	03/09/15 14:16	03/16/15 20:13	
Uranium-235/236	-0.0190	W/	0.0268	0.0268	1.00	0.150	pCi/Sample	03/09/15 14:16	03/16/15 20:13	
Uranium-238	0.0730	e	0.121	0.122	1.00	0.214	pCi/Sample	03/09/15 14:16	03/16/15 20 13	8
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
									and the last and t	4 NO. 64

HUG 20 Am 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Client Sample ID: WAA-04-AF-PS-20150225

Date Collected: 02/25/15 10:53 Date Received: 03/02/15 10:35 Lab Sample ID: 160-10707-4

Matrix: Filter

Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: \\ Date Collected: 02/25/\\ Date Received: 03/02/\' Method: 9315 - Total Analyte Total Alpha Radium Carrier	0.000 0.0333 %Yield 92.7 WAA-05-A 15 10:30 15 10:35 Apha Radiu		0.0198 0.0715 Limits 30 - 110 50225 Count Uncert. (20+/-) 0.568 Limits	Total Uncert. (2σ+/-)	1.00 1.00	MDC	pCi/Sample pCi/Sample	03/09/15 14:16 03/09/15 14:16 Prepared 03/09/15 14:16 Lab Sam Prepared 03/11/15 11:29 Prepared	03/16/15 20:13 03/16/15 20:13 Analyzed 03/16/15 20:13 ple ID: 160-10 Matri Analyzed 03/12/15 18.49 Analyzed	Dil Fa Dil Fa
Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: \ Date Collected: 02/25/2 Date Received: 03/02/2 Method: 9315 - Total Analyte	0.000 0.0333 %Yield 92.7 WAA-05-A 15 10:30 15 10:35 Apha Radiu	Qualifier F-PS-201 Im (GFPC) Qualifier	0.0715 Limits 30 - 110 50225 Count Uncert. (20+/-)	0.0716 Total Uncert. (2σ+/-)	1.00	0.141 MDC	pCi/Sample Unit	03/09/15 14:16 Prepared 03/09/15 14:16 Lab Sam	03/16/15 20:13 Analyzed 03/16/15 20:13 ple ID: 160-10 Matri)707- x: Filte
Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: \ Date Collected: 02/25/- Date Received: 03/02/- Method: 9315 - Total	0.000 0.0333 %Yield 92.7 WAA-05-A 15 10:30 15 10:35 Apha Radiu	Qualifier F-PS-201	0.0715 Limits 30 - 110 50225 Count Uncert.	0.0716 Total Uncert.	1.00	0.141	pCi/Sample	03/09/15 14:16 Prepared 03/09/15 14:16 Lab Sam	03/16/15 20:13 Analyzed 03/16/15 20:13 ple ID: 160-10 Matri)707- x: Filte
Jranium-235/236 Jranium-238 Fracer Jranium-232 Lient Sample ID: \ ate Collected: 02/25/- ate Received: 03/02/-	0.000 0.0333 %Yield 92.7 WAA-05-A 15 10:30 15 10:35	Qualifier F-PS-201	0.0715 Limits 30 - 110 50225	0.0716				03/09/15 14:16 Prepared 03/09/15 14:16	03/16/15 20:13 Analyzed 03/16/15 20:13 ple ID: 160-10)707-
Jranium-235/236 Jranium-238 Tracer Uranium-232 Iient Sample ID: \ ate Collected: 02/25/- ate Received: 03/02/-	0.000 0.0333 %Yield 92.7 WAA-05-A 15 10:30 15 10:35	Qualifier F-PS-201	0.0715 Limits 30 - 110	0.0716				03/09/15 14:16 Prepared 03/09/15 14:16	03/16/15 20:13 Analyzed 03/16/15 20:13 ple ID: 160-10	707
Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: Vate Collected: 02/25/2ate Received: 03/02/2	0.000 0.0333 %Yield 92.7 WAA-05-A 15 10:30 15 10:35	Qualifier F-PS-201	0.0715 <i>Limits</i> 30 - 110					03/09/15 14:16 Prepared 03/09/15 14:16	03/16/15 20:13 Analyzed 03/16/15 20:13 ple ID: 160-10)707-
Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: Vate Collected: 02/25/	0.000 0.0333 %Yield 92.7 WAA-05-A 15 10:30	Qualifier	0.0715 <i>Limits</i> 30 - 110					03/09/15 14:16 Prepared 03/09/15 14:16	03/16/15 20:13 Analyzed 03/16/15 20:13 ple ID: 160-10)707-
Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: Vate Collected: 02/25/	0.000 0.0333 %Yield 92.7 WAA-05-A 15 10:30	Qualifier	0.0715 <i>Limits</i> 30 - 110					03/09/15 14:16 Prepared 03/09/15 14:16	03/16/15 20:13 Analyzed 03/16/15 20:13 ple ID: 160-10	0707
Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: \	0.000 0 0333 %Yield 92.7	Qualifier	0.0715 <i>Limits</i> 30 - 110					03/09/15 14:16 Prepared 03/09/15 14:16	03/16/15 20:13 Analyzed 03/16/15 20:13 ple ID: 160-10	0707
Uranium-235/236 Uranium-238 Tracer Uranium-232	0.000 0 0333 %Yield 92.7	Qualifier	0.0715 <i>Limits</i> 30 - 110					03/09/15 14:16 Prepared 03/09/15 14:16	03/16/15 20:13 Analyzed 03/16/15 20:13	
Uranium-235/236 Uranium-238 <i>Tracer</i>	0.000 0 0333 % <i>Yield</i>		0.0715 <i>Limits</i>					03/09/15 14:16 Prepared	03/16/15 20:13 Analyzed	Dil F
Uranium-235/236 Uranium-238	0.000 0.0333		0.0715					03/09/15 14:16	03/16/15 20:13	Dil 5
Uranium-235/236	0.000									
		4	0.0198	0.0198	1.00	0.0713	pCi/Sample	03/09/15 14:16	03/16/15 20:13	
Uranium-233/234		W. C. W.								
	0.0716	4	0.0897	0.0899	1.00	0.141	pCi/Sample	03/09/15 14:16	03/16/15 20:13	
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil F
			Uncert.	Uncert.						
Method: A-01-K - ISO	topic Oraniu	iii (Aihiia 3	Count	Total						
Method: A-01-R - Iso	iania liusudu	ma /Almha O	m a néma 1 1							
Thorium-229	96.2		30 - 110					03/09/15 14:16	03/16/15 20:10	
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil F
THOHUM-232	0.0288		0.0537	0.0537	0.00	0.101	pCi/Sample	03/09/15 14:16	03/16/15 20:10	
Thorium-230 Thorium-232	0.303 0.0288	111	0.152 0.0537	0.154 0.0537	1.00	0.101 0.101	pCi/Sample	03/09/15 14:16	03/16/15 20:10	
	0.193	Wy	0.156	0.157	1.00	0.222	pCi/Sample	03/09/15 14:16	03/16/15 20:10	
Analyte Thorium-228		Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC		Prepared	Analyzed	Dil F
		0 15	Uncert.	Uncert.						
			Count	Total						
Method: A-01-R - Isot	opic Thoriu	m (Alpha S								
Ba Carrier	100		40 - 110					03/11/15 11:29	03/12/15 18.49	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil F
	0.0971	W	0.407	0.407	(1.00)	0.776	pCi/Sample	03/11/15 11:29	03/12/15 18:49	
Total Alpha Radium		Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil F
	Pacult									
Analyte Total Alpha Radium	Pacult		Uncert.	Uncert.						

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)
Count

Thorium-229

		Uncert.	Uncert.						
Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
0.123	u	0.157	0.157	1.00	0.261	pCi/Sample	03/09/15 14:16	03/16/15 20 10	1
0.544	J	0.205	0.210	1.00	0.105	pCi/Sample	03/09/15 14:16	03/16/15 20:10	1
0.151	3	0.107	0.108	1.00	0.0567	pCi/Sample	03/09/15 14:16	03/16/15 20:10	1
9/ Viola	Qualifier	Limite					Propared	Analyzed	Dil Fac
	0.123 0.544 0.151	0.151	Result Qualifier (2σ+/-) 0.123 0.157 0.544 0.205 0.151 0.107	Result Qualifier (2σ+/-) (2σ+/-) 0.123 0.157 0.157 0.544 0.205 0.210	Result Qualifier (2σ+/-) (2σ+/-) RL 0.123 0.157 0.157 0.00 0.544 0.205 0.210 1.00 0.151 0.107 0.108 1.00	Result Qualifier (2σ+/-) (2σ+/-) RL MDC 0.123 U 0.157 0.157 100 0.261 0.544 0.205 0.210 1.00 0.105 0.151 0.107 0.108 1.00 0.0567	Result Qualifier (2σ+/-) (2σ+/-) RL MDC Unit 0.123 U 0.157 0.157 0.057 0.00 0.261 pCi/Sample 0.544 3 0.205 0.210 1.00 0.105 pCi/Sample 0.151 3 0.107 0.108 1.00 0.0567 pCi/Sample	Result Qualifier (2σ+/-) (2σ+/-) RL MDC Unit Prepared 0.123 U 0.157 0.157 1.00 0.261 pCi/Sample 03/09/15 14:16 0.544 J 0.205 0.210 1.00 0.105 pCi/Sample 03/09/15 14:16 0.151 J 0.107 0.108 1.00 0.0567 pCi/Sample 03/09/15 14:16	Result Qualifier (2σ+/-) (2σ+/-) RL MDC Unit Prepared Analyzed 0.123 0.157 0.157 0.00 0.261 pCi/Sample 03/09/15 14:16 03/16/15 20:10 0.544 0.205 0.210 1.00 0.105 pCi/Sample 03/09/15 14:16 03/16/15 20:10 0.151 0.107 0.108 1.00 0.0567 pCi/Sample 03/09/15 14:16 03/16/15 20:10

Total

30 - 110

HUE 28 Apr 15 Prepared Analyzed 03/09/15 14 16 03/16/15 20 10

TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Lab Sample ID: 160-10707-5

Matrix: Filter

Client Sample ID: WAA-05-AF-PS-20150225

Date Collected: 02/25/15 10:30 Date Received: 03/02/15 10:35

Analyte

Tracer

Uranium-233/234

Uranium-235/236

Uranium-238

Uranium-232

Ba Carrier

Thorium-229

Uranium-232

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

-0.00951 L

96.0

%Yield Qualifier

		Count	Total
		Uncert.	Uncert.
Result	Qualifier	(20+/-)	(20+/-)
0.0138	V	0.0582	0.0583
.00951	U	0.0190	0.0190
0.131	7	0.106	0.106

Limits

30 - 110

40 - 110

30 - 110

30 - 110

MDC Unit RL 1.00 0.135 pCi/Sample 1.00 pCi/Sample 0.120 pCi/Sample 1.00

Prepared Analyzed 03/09/15 14:16 03/09/15 14:16 03/09/15 14:16

Prepared

03/09/15 14:16

03/16/15 20:13 03/16/15 20:13 03/16/15 20:13

Analyzed Dil Fac 03/16/15 20 13

Dil Fac

Client Sample ID: WAA-00-AF-FB-20150225

Method: 9315 - Total Apha Radium (GFPC)

Date Collected: 02/25/15 00:00 Date Received: 03/02/15 10:35

Lab Sample ID: 160-10707-6

Matrix: Filter

Dil Fac

	•	, ,	Count Uncert.	Total Uncert.						
Analyte	0.0000000000000000000000000000000000000	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC		Prepared	Analyzed	Dil Fac
Total Alpha Radium	0,363	Ч	0.474	0.475	1.00	0.791	pCi/Sample	03/11/15 11:29	03/12/15 18:49	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

Method: A-01-R - I	sotopic Thoriu	m (Alpha S	pectrometry)
	•		Count	Total
			Uncert.	Uncert.
Analyte	Result	Qualifier	(20+/-)	(2σ+/-)
Thorium-228	0.0626	U	0.115	0.116
Thorium-230	0.325	1	0.154	0.157
Thorium-232	0.0213	M	0.0559	0.0559
Tracer	%Yield	Qualifier	Limits	

106

RL	MDC	Unit	
(1.00)	0.209	pCi/Sample	03
1.00	0.0550	pCi/Sample	03
1.00	0.120	pCi/Sample	03

Prepared Dil Fac Analyzed 3/09/15 14:16 03/16/15 20:10 3/09/15 14:16 03/16/15 20:10 3/09/15 14:16 03/16/15 20:10

03/11/15 11:29 03/12/15 18:49

Prepared Analyzed 03/09/15 14:16 03/16/15 20:10

Method:	A-01-R	 Isotopic 	Uranium	(Alpha	Spectrometry)
					Count

93.1

			Count	Total
			Uncert.	Uncert.
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)
Uranium-233/234	0.0377	W	0.0869	0.0869
Uranium-235/236	0.000	U1 _	0.0204	0.0204
Uranium-238	0.138		0.104	0.105
Tracer	%Yield	Qualifier	Limits	

86.5

	RL	MDC	Unit
-	1.00	0.170	pCi/Sample
	1.00	0.0735	pCi/Sample
	1.00	0.0589	pCi/Sample

Prepared	Analyzed	Dil Fac		
03/09/15 14:16	03/16/15 20:13	1		
03/09/15 14:16	03/16/15 20:13	1		
03/09/15 14:16	03/16/15 20:13	1		

Prepared	Analyzed	Dil Fac
03/09/15 14:16	03/16/15 20:13	1

20 Apr 15 HUE

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Method: 9315 - Total Apha Radium (GFPC)

Lab Sample ID: MB 160-178637/1-A

Matrix: Filter

Analysis Batch: 178893

Client Sample ID: Method Blank

Prep Batch: 178637

Prep Type: Total/NA

rotal / upria r taalani	МВ		0.000	0.000			po# oap.o	00/11/10/11/20	00/12/10 10:00	·	
Total Alpha Radidili	0.1773	00	0.509	0.503	1.00	1.02	polioampie	03/11/13 11:29	00/12/10 10:09	'	
Total Alpha Radium	0.1773	UG	0.569	0.569	1.00	1.02	pCi/Sample	03/11/15 11:29	03/12/15 18:39	1	
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac	
	MB	MB	Uncert.	Uncert.							
			Count	Total							

Lab Sample ID: LCS 160-178637/2-A

Matrix: Filter

Ba Carrier

Analysis Batch: 178893

40 - 110

102

Client Sample ID: Lab Control Sample

03/12/15 18:39

Prep Type: Total/NA **Prep Batch: 178637**

Total LCS LCS %Rec. Spike Uncert. Added Analyte Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits 44.7 44.27 1.00 1.16 pCi/Samp 4.97 99 65 - 150 Total Alpha Radium

LCS LCS Carrier %Yield Qualifier Limits Ba Carrier 40 - 110 93.8

Lab Sample ID: LCSD 160-178637/3-A

Matrix: Filter

Radium

Analysis Batch: 178893

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

03/11/15 11:29

Prep Batch: 178637

Total Spike LCSD LCSD Uncert. %Rec. RER Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits RER Limit Total Alpha 44.7 43.40 4.92 1.00 1.20 pCi/Samp

LCSD LCSD Carrier %Yield Qualifier Limits Ba Carrier 90.3 40 - 110

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-177795/1-A Client Sample ID: Method Blank **Matrix: Filter** Prep Type: Total/NA

Prep Batch: 177795 Analysis Batch: 179856

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.06301	U	0.118	0.118	1.00	0.213	pCi/Sample	03/09/15 14:16	03/16/15 20:10	1
Thorium-230	0.2844		0.147	0.148	1.00	0.116	pCi/Sample	03/09/15 14:16	03/16/15 20:10	1
Thorium-232	0.02772	U	0.0516	0.0517	1.00	0.0968	pCi/Sample	03/09/15 14:16	03/16/15 20:10	1
	МВ	MB								
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	99.5	_	30 - 110					03/09/15 14:16	03/16/15 20:10	

TestAmerica St. Louis

TestAmerica Job ID: 160-10707-2

Client: Tetra Tech EM Inc.

Analysis Batch: 179857

Matrix: Filter

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCS 160-177795/2-A

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 177795

Total LCS LCS %Rec. Spike Uncert. Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits Thorium-230 15.83 1.72 1.00 0.122 pCi/Samp 16.1 81 - 118

LCS LCS

%Yield Qualifier Tracer Limits 30 - 110 Thorium-229 93.3

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 177795

Lab Sample ID: LCSD 160-177795/3-A **Matrix: Filter**

Analysis Batch: 179858

				Total							
	Spike	LCSD	LCSD	Uncert.				%Rec.		RER	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC Unit	%Rec	Limits	RER	Limit	
Thorium-230	16.1	16.59		1.79	1.00	0.125 pCi/Samp	103	81 - 118	0.22	1	
		Analyte Added Added	Analyte Added Result	Analyte Added Result Qual	Spike LCSD LCSD Uncert. Analyte Added Result Qual (2σ+/-)	Spike LCSD LCSD Uncert. Analyte Added Result Qual (2σ+/-) RL	Spike LCSD LCSD Uncert. Analyte Added Result Qual (2σ+/-) RL MDC Unit	Spike LCSD LCSD Uncert. Analyte Added Result Qual (2σ+/-) RL MDC Unit %Rec	Spike LCSD LCSD Uncert. %Rec. Analyte Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits	Spike LCSD LCSD Uncert. %Rec.	Spike LCSD LCSD Uncert.

LCSD LCSD

Tracer %Yield Qualifier Limits Thorium-229 89.7 30 - 110

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-177797/1-A

Matrix: Filter

Analysis Batch: 179871

Client S	ample ID:	Method	Blank
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Prep Type: Total/NA Prep Batch: 177797

			Count	i Otai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.09303	U	0.100	0.100	1.00	0.144	pCi/Sample	03/09/15 14:16	03/16/15 20:13	1
Uranium-235/236	0.03859	U	0.0719	0.0719	1.00	0.135	pCi/Sample	03/09/15 14:16	03/16/15 20:13	1
Uranium-238	0.05375	U	0.0831	0.0832	1.00	0.144	pCi/Sample	03/09/15 14:16	03/16/15 20:13	1

Total

Count

MB MB

Qualifier Limits Tracer %Yield Prepared Analyzed Dil Fac 87.6 30 - 110 03/09/15 14:16 03/16/15 20:13 Uranium-232

Lab Sample ID: LCS 160-177797/2-A

Matrix: Filter

Analysis Batch: 179872

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 177797

				iotai						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Uranium-233/23	25.5	26.13		2.62	1.00	0.128	pCi/Samp	103	84 - 120	
4										
Uranium-238	26.0	26.53		2.65	1.00	0.0583	pCi/Samp	102	82 - 122	

LCS LCS

%Yield Qualifier Limits Tracer 88.1 30 - 110 Uranium-232

TestAmerica St. Louis

QC Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 177797

-Lab Sample ID: LCSD 160-177797/3-A

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Matrix: Filter

Analysis Batch: 179873

				iotai							
	Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Uranium-233/23	25.5	23.92		2.43	1.00	0.166	pCi/Samp	94	84 - 120	0.44	1
4 Uranium-238	26.0	25.46		2.56	1.00	0.141	pCi/Samp	98	82 - 122	0.20	1
1000 1000											

Total

 LCSD
 LCSD

 Tracer
 %Yield
 Qualifier
 Limits

 Uranium-232
 89.0
 30 - 110

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QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10707-2

Rad

Prep Batch: 177795

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10707-1	WAA-01-AF-PS-20150225	Total/NA	Filter	ExtChrom	
160-10707-2	WAA-02-AF-PS-20150225	Total/NA	Filter	ExtChrom	
160-10707-3	WAA-03-AF-PS-20150225	Total/NA	Filter	ExtChrom	
160-10707-4	WAA-04-AF-PS-20150225	Total/NA	Filter	ExtChrom	
160-10707-5	WAA-05-AF-PS-20150225	Total/NA	Filter	ExtChrom	
160-10707-6	WAA-00-AF-FB-20150225	Total/NA	Filter	ExtChrom	
LCS 160-177795/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-177795/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-177795/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 177797

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10707-1	WAA-01-AF-PS-20150225	Total/NA	Filter	ExtChrom	_
160-10707-2	WAA-02-AF-PS-20150225	Total/NA	Filter	ExtChrom	
160-10707-3	WAA-03-AF-PS-20150225	Total/NA	Filter	ExtChrom	
160-10707-4	WAA-04-AF-PS-20150225	Total/NA	Filter	ExtChrom	
160-10707-5	WAA-05-AF-PS-20150225	Total/NA	Filter	ExtChrom	
160-10707-6	WAA-00-AF-FB-20150225	Total/NA	Filter	ExtChrom	
LCS 160-177797/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-177797/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-177797/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 178637

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10707-1	WAA-01-AF-PS-20150225	Total/NA	Filter	DPS-0	_
160-10707-2	WAA-02-AF-PS-20150225	Total/NA	Filter	DPS-0	
160-10707-3	WAA-03-AF-PS-20150225	Total/NA	Filter	DPS-0	
160-10707-4	WAA-04-AF-PS-20150225	Total/NA	Filter	DPS-0	
160-10707-5	WAA-05-AF-PS-20150225	Total/NA	Filter	DPS-0	
160-10707-6	WAA-00-AF-FB-20150225	Total/NA	Filter	DPS-0	
LCS 160-178637/2-A	Lab Control Sample	Total/NA	Filter	DPS-0	
LCSD 160-178637/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0	
MB 160-178637/1-A	Method Blank	Total/NA	Filter	DPS-0	

TestAmerica St. Louis

3/31/2015

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TestAmerica Job ID: 160-10707-2

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-10707-1	WAA-01-AF-PS-20150225	106	
160-10707-2	WAA-02-AF-PS-20150225	103	
160-10707-3	WAA-03-AF-PS-20150225	106	
160-10707-4	WAA-04-AF-PS-20150225	100	
160-10707-5	WAA-05-AF-PS-20150225	97.9	
160-10707-6	WAA-00-AF-FB-20150225	106	
LCS 160-178637/2-A	Lab Control Sample	93.8	
LCSD 160-178637/3-A	Lab Control Sample Dup	90.3	
MB 160-178637/1-A	Method Blank	102	
Tracer/Carrier Legend			

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Th-229	
Lab Sample ID	Client Sample ID	(30-110)	
160-10707-1	WAA-01-AF-PS-20150225	95.3	
160-10707-2	WAA-02-AF-PS-20150225	91.4	
160-10707-3	WAA-03-AF-PS-20150225	97.8	
160-10707-4	WAA-04-AF-PS-20150225	96.2	
160-10707-5	WAA-05-AF-PS-20150225	91.6	
160-10707-6	WAA-00-AF-FB-20150225	93.1	
LCS 160-177795/2-A	Lab Control Sample	93.3	
LCSD 160-177795/3-A	Lab Control Sample Dup	89.7	
MB 160-177795/1-A	Method Blank	99.5	

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		U-232	
_ab Sample ID	Client Sample ID	(30-110)	
160-10707-1	WAA-01-AF-PS-20150225	95.0	
160-10707-2	WAA-02-AF-PS-20150225	93.2	
160-10707-3	WAA-03-AF-PS-20150225	95.4	
160-10707-4	WAA-04-AF-PS-20150225	92.7	
160-10707-5	WAA-05-AF-PS-20150225	96.0	
160-10707-6	WAA-00-AF-FB-20150225	86.5	
_CS 160-177797/2-A	Lab Control Sample	88.1	
_CSD 160-177797/3-A	Lab Control Sample Dup	89.0	
MB 160-177797/1-A	Method Blank	87.6	

U-232 = Uranium-232

TestAmerica St. Louis

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 9, 2015
Sample Delivery Group (SDG):	J10788
Sample Numbers:	WAA-01-AF-PS-20150304, WAA-02-AF-PS-20150304, WAA-03-AF-PS-20150304, WAA-04-AF-PS-20150304, WAA-05-AF-PS-20150304, and WAA-00-AF-FB-20150304
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Laboratory Agency Radiological Interest as a specified in the applicable north apparent from the summary data partial water found, and data qualificate imited to the available field and laboratory Radiological Radiological Radiological Radiological Radiological Radiological Radiological Radiological Laboratory Agency Radiological Laboratory Radiological	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10788 included five (5) environmental air (filter) samples and one (1) QC samples (a field blank). Samples were analyzed for gross alpha and beta radiation by EPA SW-846 Method 9310 and for cesium-137 and other gamma-emitters by Department of Energy (DOE) Method Ga-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. LCS and duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded no detectable activities and the field blank a low beta activity. The other field samples yielded more than 5 times the field blank beta activity, so no qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

V. Surrogates

Surrogates are not used in these radioanalytical methods.

VI. Comments

Some detected activities were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with no significant qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10788-2

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

al

Authorized for release by: 3/20/2015 10:59:44 AM

Erika Gish, Project Manager II (314)298-8566

erika.gish@testamericainc.com

·····LINKS ······

Review your project results through
Total Access

Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10788-2

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-2

Job ID: 160-10788-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10788-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup

Method 3620C: Florisil Cleanup Method 3630C: Silica Gel Cleanup Method 3640A: Gel-Permeation Cleanup Method 3650B: Acid-Base Partition Cleanup

Method 3660B: Sulfur Cleanup

Method 3665A: Sulfuric Acid/Permanganate Cleanup

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-2

Job ID: 160-10788-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

RECEIPT

The samples were received on 3/9/2015 10:25 AM; the samples arrived in good condition, properly preserved. The temperature of the cooler at receipt was 18.0° C.

GROSS ALPHA AND GROSS BETA RADIOACTIVITY

Samples WAA-01-AF-PS-20150304 (160-10788-1), WAA-02-AF-PS-20150304 (160-10788-2), WAA-03-AF-PS-20150304 (160-10788-3), WAA-04-AF-PS-20150304 (160-10788-4), WAA-05-AF-PS-20150304 (160-10788-5) and WAA-00-AF-FB-20150304 (160-10788-6) were analyzed for Gross Alpha and Gross Beta Radioactivity in accordance with SW846 9310. The samples were prepared and analyzed on 03/10/2015.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

RADIUM-226 & OTHER GAMMA EMITTERS (GS)

Samples WAA-01-AF-PS-20150304 (160-10788-1), WAA-02-AF-PS-20150304 (160-10788-2), WAA-03-AF-PS-20150304 (160-10788-3), WAA-04-AF-PS-20150304 (160-10788-4), WAA-05-AF-PS-20150304 (160-10788-5) and WAA-00-AF-FB-20150304 (160-10788-6) were analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with GA-01-R. The samples were prepared on 03/10/2015 and analyzed on 03/10/2015 and 03/11/2015.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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TestAmerica St. Louis

Chain of Custody Record

THE LEADER IN ENVIRONMENTAL TESTING

13715 Rider Trail North

Earth City, MO 63045 Regulatory Program: DW phone 314.298.8566 fax NPDES RCRA TestAmerica Laboratories, Inc. Other: **Client Contact** Project Manager: Dave Kinroth Site Contact: Dave Kinroth Date: 3-9-15 COC No: Tetra Tech. Inc. Tel/Fax: 314-517-6798 Lab Contact: Mike Franks Carrier: NA COCs 415 Oak Street **Analysis Turnaround Time** Sampler: CALENDAR DAYS **✓** WORKING DAYS Kansas City, MO 64106 For Lab Use Only: Walk-in Client: (816) 412-1786 Phone TAT if different from Below 9315 Radium-226 (GFPC) 9315 Total Alpha Radium (816) 816-410-1748 FAX Uranium Lab Sampling: 2 weeks 9310 Gross Alpha/Beta Project Name: West Lake Landfill Site 1 week Perform MS / MSD Site: Bridgeton, MO Job / SDG No.: 2 days A-01-R Isotopic PO# 1105610 1 day Sample GA-01-R A-01-R Type Sample Sample #of (C=Comp, Date Time G=Grab) Sample Identification Matrix Cont Sample Specific Notes: 3/4/15 X 11:15 WAA-01-AF-PS-20150304 Filter Air 9315 Radium-226 (GFPC) contingent upon TAR results 3/4/15 X WAA-02-AF-PS-20150304 10:24 Filter Air 1 for all samples 3/4/15 X X 11:04 Filter Air WAA-03-AF-PS-20150304 1 3/4/15 X X 10:53 Air WAA-04-AF-PS-20150304 Filter 3/4/15 WAA-05-AF-PS-20150304 10:36 Filter Air X X X 3/4/15 X Χ X X WAA-00-AF-FB-20150304 NA Filter Air Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Sample Disposal (A fee may be assessed if samples are retained longer than 1 Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. Skin Irritant Poison B Unknown Archive for_ Months Return to Client Disposal by Lab ✓ Non-Hazard Hammable Special Instructions/QC Requirements & Comments: Cooler Temp. (°C): Obs'd: Corr'd: Therm ID No.: Custody Seals Intact: Custody Seal No.: Yes □ No Company: Date/Time: Date/Time: 1025 Reseived by: Relinguished by: Company: Boulson letra Tech ASTrou 3/9/15 1025 Date/Time: Received by: Company: Date/Time: Relinquished by: Company: Date/Time: Relinquished by: Company: Date/Time: Received in Laboratory by: Company:

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013





















Client: Tetra Tech EM Inc.

Job Number: 160-10788-2

Login Number: 10788 List Source: TestAmerica St. Louis

List Number: 1 Creator: Clarke, Jill C

orditor. Ordino, ordino	
Question	Answer Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td>	True
The cooler's custody seal, if present, is intact.	N/A
Sample custody seals, if present, are intact.	True
The cooler or samples do not appear to have been compromised or tampered with.	True
Samples were received on ice.	N/A
Cooler Temperature is acceptable.	True
Cooler Temperature is recorded.	True
COC is present.	True
COC is filled out in ink and legible.	True
COC is filled out with all pertinent information.	True
Is the Field Sampler's name present on COC?	N/A
There are no discrepancies between the containers received and the COC.	True
Samples are received within Holding Time.	True
Sample containers have legible labels.	True
Containers are not broken or leaking.	True
Sample collection date/times are provided.	True
Appropriate sample containers are used.	True
Sample bottles are completely filled.	True
Sample Preservation Verified.	True
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A
Multiphasic samples are not present.	True
Samples do not require splitting or compositing.	True
Residual Chlorine Checked.	N/A

TestAmerica St. Louis

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Minimum Level (Dioxin)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Not Calculated

Quality Control

Relative error ratio

TestAmerica Job ID: 160-10788-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

ML

NC

ND PQL

QC

RER RL

RPD

TEF

TEQ

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit

TestAmerica St. Louis

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-2

Method	Method Description	Protocol	Laboratory
9310	Gross Alpha / Beta (GFPC)	SW846	TAL SL
GA-01-R	Cesium-137 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10788-1	WAA-01-AF-PS-20150304	Filter	03/04/15 11:15	03/09/15 10:25
160-10788-2	WAA-02-AF-PS-20150304	Filter	03/04/15 10:24	03/09/15 10:25
160-10788-3	WAA-03-AF-PS-20150304	Filter	03/04/15 11:04	03/09/15 10:25
160-10788-4	WAA-04-AF-PS-20150304	Filter	03/04/15 10:53	03/09/15 10:25
160-10788-5	WAA-05-AF-PS-20150304	Filter	03/04/15 10:36	03/09/15 10:25
160-10788-6	WAA-00-AF-FB-20150304	Filter	03/04/15 00:00	03/09/15 10:25

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-2

Client Sample ID: WAA-01-AF-PS-20150304 Lab Sample ID: 160-10788-1

Date Collected: 03/04/15 11:15

Matrix: Filter

Date Received: 03/09/15 10:25

			Count	Total						
Analyte	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.638	3	0.320	0.328	10.0	0.368	pCi/Sample	03/10/15 12:57	03/10/15 17:26	1
Gross Beta	16.9		1.15	2.05	10.0	0.422	pCi/Sample	03/10/15 12:57	03/10/15 17:26	1
Method: GA-01-R -	Cesium-137 8	Other Gan	nma Emitters	(GS)						
	ocoldin-tor c	. Other Out	Count	Total						
	ocolum-tor c	. 0								
		Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Analyte Cesium-137		Qualifier	Count Uncert.	Total Uncert.	RL 20.0	MDC 14.0		Prepared 03/10/15 12.59	Analyzed 03/11/15 07:44	Dil Fac
Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)			-			Dil Fac
Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)			-			Dil Fac
Analyte Cesium-137	Result -3.38	Qualifier	Count Uncert. (2σ+/-) 18.1 Count	Total Uncert. (2σ+/-) 18.1 Total			pCi/Sample			Dil Fac

Client Sample ID: WAA-02-AF-PS-20150304

Date Collected: 03/04/15 10:24

Date Received: 03/09/15 10:25

Lab Sample ID: 160-10788-2

Matrix: Filter

Method: 9310 - G	1033 Alpila / De	ta (0110)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.304	U	0.243	0.245	10.0	0.339	pCi/Sample	03/10/15 12:57	03/10/15 17:26	1
Gross Beta	14.0		1.06	1.75	10.0	0.414	pCi/Sample	03/10/15 12:57	03/10/15 17:26	1
Method: GA-01-R	- Cesium-137 d	k Other Gai	Count	Total						
Wethou: GA-01-K	- Cesium-137 d	k Other Gai		and the second second						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-0.00644	W	5.02	5.02	20.0	9.39	pCi/Sample	03/10/15 12:59	03/10/15 21:45	1
			Count	Total						

Other Detected Uncert. Uncert. Radionuclides Result Qualifier $(2\sigma + /-)$ $(2\sigma + /-)$ RL MDC Unit Prepared Analyzed None 03/10/15 12:59 03/10/15 21 45 pCi/Sample Other Detected Radionuclide

Client Sample ID: WAA-03-AF-PS-20150304

Date Collected: 03/04/15 11:04

Date Received: 03/09/15 10:25

Lab Sample ID: 160-10788-3

Matrix: Filter

Method: 9310 - Gro	ss Alpha / Be	ta (GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(20+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.384	W	0.290	0.293	10.0	0.414	pCi/Sample	03/10/15 12:57	03/10/15 17:26	1
Gross Beta	16.3		1.13	1.98	10.0	0.406	pCi/Sample	03/10/15 12.57	03/10/15 17 26	1

HUE 9 April 2915

TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-2

Client Sample ID: WAA-03-AF-PS-20150304

Date Collected: 03/04/15 11:04 Date Received: 03/09/15 10:25

Lab Sample ID: 160-10788-3

Matrix: Filter

Method: GA-01-R - Cesium-137	&	Other Gamma	Emitters	(GS)
			Count	To

			Count	Total
			Uncert.	Uncert.
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)
Cesium-137	-0.0678	U	5.11	5,11
			Count	Total
Other Detected			Uncert.	Uncert.
Radionuclides	Result	Qualifier	(2c+/-)	(20+/-)

RL MDC Unit Prepared Analyzed Dil Fac 20.0 9.75 pCi/Sample 03/10/15 12:59 03/10/15 21:43

None

MDC Unit Prepared Analyzed pCi/Sample 03/10/15 12 59 03/10/15 21.43

Dil Fac

Client Sample ID: WAA-04-AF-PS-20150304

Date Collected: 03/04/15 10:53 Date Received: 03/09/15 10:25

Other Detected

Radionuclide

Lab Sample ID: 160-10788-4

Matrix: Filter

Method: 9310 - Gross Alpha / Beta (GFPC)

l				Count	Total						
l				Uncert.	Uncert.						
	Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
1	Gross Alpha	0.475	3	0.275	0.280	10.0	0.327	pCi/Sample	03/10/15 12:57	03/10/15 18:42	1
	Gross Beta	13.6		1.04	1.71	10.0	0.378	pCi/Sample	03/10/15 12:57	03/10/15 18:42	1

RL

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

			Count	Total
			Uncert.	Uncert.
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)
Cesium-137	-0.545	W	5.54	5.54
			Count	Total
Other Detected			Uncert.	Uncert.
Radionuclides	Result	Qualifier	(20+/-)	(20+/-)
Be-7	129		52.8	54.4

RL	MDC	Unit	Prepared	Analyzed	Dil Fac
20.0	10.5	pCi/Sample	03/10/15 12:59	03/10/15 21:44	1

47.4 pCi/Sample

Client Sample ID: WAA-05-AF-PS-20150304

Lab Sample ID: 160-10788-5

Matrix: Filter

03/10/15 12:59 03/10/15 21:44

Date Collected: 03/04/15 10:36

Date Received: 03/09/15 10:25

Method: 9310 - Gro	ss Alpha / Be	ta (GFPC)								
	•		Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL.	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.374	7	0.237	0.241	10.0	0.277	pCi/Sample	03/10/15 12:57	03/10/15 18:42	1
Gross Beta	13.7		1.06	1.73	10.0	0.401	pCi/Sample	03/10/15 12:57	03/10/15 18:42	1

Method: GA-01-R - Cesium-13	7 &	Other	Gamma	Em	itters	(GS)	
				450,070			

method. OA-01-11 - OC	Sidili-107 & Other Oan	mia Limiters	, (00)
		Count	Total
		Uncert.	Uncert.
Analyte	Result Qualifier	(2σ+/-)	(2σ+/-)
Cesium-137	-0.569	6.10	6.10

RL	MDC	Unit	Prepared	Analyzed	Dil Fac
20.0	11.1	pCi/Sample	03/10/15 12:59	03/10/15 21:45	1

TestAmerica St. Louis

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3/20/2015

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-2

Client Sample ID: WAA-05-AF-PS-20150304

Date Collected: 03/04/15 10:36

Date Received: 03/09/15 10:25

Lab Sample ID; 160-10788-5

Matrix: Filter

			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	03/10/15 12:59	03/10/15 21 45	1
Radionuclide										

Client Sample ID: WAA-00-AF-FB-20150304

Date Collected: 03/04/15 00:00

Lab Sample ID: 160-10788-6

Matrix: Filter

Date	Received:	03/09/15	10:25
7		THE RESERVE AND PARTY AND PERSONS ASSESSED.	

Method: 9310 - Gro	ss Alpha / Be	ta (GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Gross Alpha	0.126	CU.	0.209	0.210	10.0	0.368	pCi/Sample	03/10/15 12:57	03/10/15 18:42	
Gross Beta	1.71		0.422	0.455	10.0	0.422	pCi/Sample	03/10/15 12:57	03/10/15 18:42	
Analyte	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Analyte	Result	Qualifier			RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Cesium-137	-0.111	y	4.24	4.24	20.0	8.01	pCi/Sample	03/10/15 12:59	03/10/15 22:52	
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(2\sigma+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Other Detected	None						pCi/Sample	03/10/15 12:59	03/10/15 22:52	
Radionuclide										

HUG 9 April 5 Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Method: 9310 - Gross Alpha / Beta (GFPC)

Lab Sample ID: MB 160-178118/1-A

Matrix: Filter

Analysis Batch: 177956

Client Sample ID: Method Blank Prep Type: Total/NA

Prep Batch: 178118

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	-0.04461	U	0.185	0.185	10.0	0.410	pCi/Sample	03/10/15 12:57	03/10/15 17:26	1
Gross Beta	0.2815	U	0.264	0.266	10.0	0.418	pCi/Sample	03/10/15 12:57	03/10/15 17:26	1

Lab Sample ID: LCS 160-178118/2-A

Matrix: Filter

Analysis Batch: 177956

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 178118

Total LCS LCS %Rec. Spike Uncert. Analyte Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits Gross Alpha 5.36 6.217 1.11 10.0 0.327 pCi/Samp 116 75 - 125

Lab Sample ID: LCSB 160-178118/3-A

Matrix: Filter

Analysis Batch: 177956

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 178118

Total Spike LCSB LCSB Uncert. %Rec. Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits Gross Beta 17.8 18.92 2.26 10.0 0.401 pCi/Samp 106 75 - 125

Lab Sample ID: 160-10788-1 DU

Matrix: Filter

Analysis Batch: 177956

Client Sample ID: WAA-01-AF-PS-20150304

Prep Type: Total/NA

Prep Batch: 178118

					Total					
	Sample	Sample	DU	DU	Uncert.					RER
Analyte	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit	RER	Limit
Gross Alpha	0.638		0.6048		0.335	10.0	0.410	pCi/Samp	 0.05	1
Gross Beta	16.9		15.49		1.91	10.0	0.418	pCi/Samp	0.36	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-178125/1-A

Matrix: Filter

Radionuclide

Analysis Batch: 178120

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 178125

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-0.3507	U	4.45	4.45	20.0	8.44	pCi/Sample	03/10/15 12:59	03/10/15 21:46	1
			Count	Total						
Other Detected	MB	MB	Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	03/10/15 12:59	03/10/15 21:46	1

TestAmerica St. Louis

QC Sample Results

Client: Tetra Tech EM Inc.

Matrix: Filter

Cobalt-60

Radionuclide

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCS 160-178125/2-A

TestAmerica Job ID: 160-10788-2

Client Sample ID: Lab Control Sample

87 - 115

Prep Type: Total/NA

Prep Batch: 178125

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

11600

11250

Analysis Batch: 178121 Total Spike LCS LCS %Rec. Uncert. Analyte Added Result Qual (2σ+/-) MDC Unit %Rec Limits Americium-241 32000 31200 3240 113 pCi/Samp 98 87 - 116 Cesium-137 11100 10720 1130 66.7 pCi/Samp 87 - 120 20.0 97

Client Sample ID: WAA-01-AF-PS-20150304

Lab Sample ID: 160-10788-1 DU **Matrix: Filter** Prep Type: Total/NA Analysis Batch: 178130

1140

Prep Batch: 178125

97

39.3 pCi/Samp

					Total					
	Sample	Sample	DU	DU	Uncert.					RER
Analyte	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit	RER	Limit
Cesium-137	-3.38	U	0.0000	U	5.72	20.0	11.0	pCi/Samp	 0.14	1
					Total					
Other Detected	Sample	Sample	DU	DU	Uncert.					RER
Radionuclides	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit	RER	Limit
Other Detected	None		None					pCi/Samp		

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3/20/2015

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-2

Rad

Prep Batch: 178118

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10788-1	WAA-01-AF-PS-20150304	Total/NA	Filter	None	
160-10788-1 DU	WAA-01-AF-PS-20150304	Total/NA	Filter	None	
160-10788-2	WAA-02-AF-PS-20150304	Total/NA	Filter	None	
160-10788-3	WAA-03-AF-PS-20150304	Total/NA	Filter	None	
160-10788-4	WAA-04-AF-PS-20150304	Total/NA	Filter	None	
160-10788-5	WAA-05-AF-PS-20150304	Total/NA	Filter	None	
160-10788-6	WAA-00-AF-FB-20150304	Total/NA	Filter	None	
LCS 160-178118/2-A	Lab Control Sample	Total/NA	Filter	None	
LCSB 160-178118/3-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-178118/1-A	Method Blank	Total/NA	Filter	None	

Prep Batch: 178125

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10788-1	WAA-01-AF-PS-20150304	Total/NA	Filter	None	
160-10788-1 DU	WAA-01-AF-PS-20150304	Total/NA	Filter	None	
160-10788-2	WAA-02-AF-PS-20150304	Total/NA	Filter	None	
160-10788-3	WAA-03-AF-PS-20150304	Total/NA	Filter	None	
160-10788-4	WAA-04-AF-PS-20150304	Total/NA	Filter	None	
160-10788-5	WAA-05-AF-PS-20150304	Total/NA	Filter	None	
160-10788-6	WAA-00-AF-FB-20150304	Total/NA	Filter	None	
LCS 160-178125/2-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-178125/1-A	Method Blank	Total/NA	Filter	None	

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Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 9, 2015
Sample Delivery Group (SDG):	J10788
Sample Numbers:	WAA-01-AF-PS-20150304, WAA-02-AF-PS-20150304, WAA-03-AF-PS-20150304, WAA-04-AF-PS-20150304, WAA-05-AF-PS-20150304, and WAA-00-AF-FB-20150304
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
Packages from Subcontracted Laboratory Agency Radiological in the applicable north apparent from the summary data partial water found, and data qualificate imited to the available field and laboratory Radiological Laboratory Agency Radiological Radiological Laboratory Agency Radiological Radiological Laboratory Radiological Laboratory Radiological Radiological Laboratory Radiological Radiological Laboratory Radiological Rad	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10788 included five (5) environmental air (filter) samples and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and uranium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded low activities for two (of three) thorium isotopes and the field blank yielded low activities for one of them, while neither yielded detectable activities for any of the three uranium isotopes. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10788-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Elizabeth M. Aburcheur

Authorized for release by: 4/8/2015 1:49:38 PM Elizabeth Hoerchler, Project Mgmt. Assistant elizabeth.hoerchler@testamericainc.com

Designee for

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10788-1

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Job ID: 160-10788-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10788-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 03/09/2015; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 18.0° C.

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-01-AF-PS-20150304 (160-10788-1), WAA-02-AF-PS-20150304 (160-10788-2), WAA-03-AF-PS-20150304 (160-10788-3), WAA-04-AF-PS-20150304 (160-10788-4), WAA-05-AF-PS-20150304 (160-10788-5) and WAA-00-AF-FB-20150304 (160-10788-6) were analyzed for Total Alpha Radium (GFPC) in accordance with SW- 846 Method 9315. The samples were prepared on 03/13/2015 and analyzed on 03/22/2015.

Prep batch 178988: The following samples are filters that were split between multiple analyses: WAA-00-AF-FB-20150304 (160-10788-6), WAA-01-AF-PS-20150304 (160-10788-1), WAA-02-AF-PS-20150304 (160-10788-2), WAA-03-AF-PS-20150304 (160-10788-3), WAA-04-AF-PS-20150304 (160-10788-4), WAA-05-AF-PS-20150304 (160-10788-5). Insufficient sample volume was available to perform a sample duplicate (DUP). A LCS/LCSD was performed.

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TestAmerica St. Louis 4/8/2015

Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Job ID: 160-10788-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150304 (160-10788-1), WAA-02-AF-PS-20150304 (160-10788-2), WAA-03-AF-PS-20150304 (160-10788-3), WAA-04-AF-PS-20150304 (160-10788-4), WAA-05-AF-PS-20150304 (160-10788-5) and WAA-00-AF-FB-20150304 (160-10788-6) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 03/18/2015 and analyzed on 03/30/2015.

Prep batch 179746: The following samples are filters that were split between multiple analyses: WAA-00-AF-FB-20150304 (160-10788-6), WAA-01-AF-PS-20150304 (160-10788-1), WAA-02-AF-PS-20150304 (160-10788-2), WAA-03-AF-PS-20150304 (160-10788-3), WAA-04-AF-PS-20150304 (160-10788-4), WAA-05-AF-PS-20150304 (160-10788-5). Insufficient sample volume was available to perform a sample duplicate (DUP). A LCS/LCSD was performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150304 (160-10788-1), WAA-02-AF-PS-20150304 (160-10788-2), WAA-03-AF-PS-20150304 (160-10788-3), WAA-04-AF-PS-20150304 (160-10788-4), WAA-05-AF-PS-20150304 (160-10788-5) and WAA-00-AF-B-20150304 (160-10788-6) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 03/18/2015 and analyzed on 03/30/2015.

Prep batch 179747: The following samples are filters that were split between multiple analyses: WAA-00-AF-FB-20150304 (160-10788-6), WAA-01-AF-PS-20150304 (160-10788-1), WAA-02-AF-PS-20150304 (160-10788-2), WAA-03-AF-PS-20150304 (160-10788-3), WAA-04-AF-PS-20150304 (160-10788-4), WAA-05-AF-PS-20150304 (160-10788-5). Insufficient sample volume was available to perform a sample duplicate (DUP). A LCS/LCSD was performed.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

Chain of Custody Record

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

13715 Rider Trail North

Earth City, MO 63045 Regulatory Program: DW phone 314,298,8566 fax NPDES RCRA TestAmerica Laboratories, Inc. Other: **Client Contact** Project Manager: Dave Kinroth Site Contact: Dave Kinroth Date: 3-9-15 COC No: Tetra Tech. Inc. Tel/Fax: 314-517-6798 Lab Contact: Mike Franks Carrier: NA COCs 415 Oak Street **Analysis Turnaround Time** Sampler: CALENDAR DAYS **✓** WORKING DAYS Kansas City, MO 64106 For Lab Use Only: Walk-in Client: (816) 412-1786 Phone TAT if different from Below 9315 Radium-226 (GFPC) 9315 Total Alpha Radium (816) 816-410-1748 FAX Uranium Lab Sampling: 2 weeks 9310 Gross Alpha/Beta Project Name: West Lake Landfill Site 1 week Perform MS / MSD Site: Bridgeton, MO Job / SDG No.: 2 days A-01-R Isotopic PO# 1105610 1 day Sample GA-01-R A-01-R Type Sample Sample #of (C=Comp, Date Time G=Grab) Sample Identification Matrix Cont Sample Specific Notes: 3/4/15 X 11:15 WAA-01-AF-PS-20150304 Filter Air 9315 Radium-226 (GFPC) contingent upon TAR results 3/4/15 X WAA-02-AF-PS-20150304 10:24 Filter Air 1 for all samples 3/4/15 X X 11:04 Filter Air WAA-03-AF-PS-20150304 1 3/4/15 X X 10:53 Air WAA-04-AF-PS-20150304 Filter 3/4/15 WAA-05-AF-PS-20150304 10:36 Filter Air X X X 3/4/15 X Χ X X WAA-00-AF-FB-20150304 NA Filter Air Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Sample Disposal (A fee may be assessed if samples are retained longer than 1 Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. Skin Irritant Poison B Unknown Archive for_ Months Return to Client Disposal by Lab ✓ Non-Hazard Hammable Special Instructions/QC Requirements & Comments: Cooler Temp. (°C): Obs'd: Corr'd: Therm ID No.: Custody Seals Intact: Custody Seal No.: Yes □ No Company: Date/Time: Date/Time: 1025 Reseived by: Relinguished by: Company: Boulson letra Tech ASTrou 3/9/15 1025 Date/Time: Received by: Company: Date/Time: Relinquished by: Company: Date/Time: Relinquished by: Date/Time: Received in Laboratory by: Company: Company:

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013





















Client: Tetra Tech EM Inc. Job Number: 160-10788-1

List Source: TestAmerica St. Louis

Login Number: 10788 List Number: 1 Creator: Clarke, Jill C

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica St. Louis

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit

Glo

Glossary	
Abbreviation	These commonly used abbreviations may or may not be present in this report.

Listed under the "D" column to designate that the result is reported on a dry weight basis %R Percent Recovery CFL Contains Free Liquid CNF Contains no Free Liquid

DER Duplicate error ratio (normalized absolute difference)

Dil Fac

DL, RA, RE, IN Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample

DLC Decision level concentration MDA Minimum detectable activity EDL **Estimated Detection Limit** MDC Minimum detectable concentration

MDL Method Detection Limit Minimum Level (Dioxin) ML

NC Not Calculated

ND Not detected at the reporting limit (or MDL or EDL if shown)

PQL Practical Quantitation Limit

QC **Quality Control** RER Relative error ratio

RLReporting Limit or Requested Limit (Radiochemistry)

RPD Relative Percent Difference, a measure of the relative difference between two points

Toxicity Equivalent Factor (Dioxin) TEF Toxicity Equivalent Quotient (Dioxin) **TEQ**

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Method	Method Description	Protocol	Laboratory	
9315	Total Apha Radium (GFPC)	SW846	TAL SL	
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL	
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL	

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

	01: 40 1 15	••	0 !! !	
Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10788-1	WAA-01-AF-PS-20150304	Filter	03/04/15 11:15	03/09/15 10:25
160-10788-2	WAA-02-AF-PS-20150304	Filter	03/04/15 10:24	03/09/15 10:25
160-10788-3	WAA-03-AF-PS-20150304	Filter	03/04/15 11:04	03/09/15 10:25
160-10788-4	WAA-04-AF-PS-20150304	Filter	03/04/15 10:53	03/09/15 10:25
160-10788-5	WAA-05-AF-PS-20150304	Filter	03/04/15 10:36	03/09/15 10:25
160-10788-6	WAA-00-AF-FB-20150304	Filter	03/04/15 00:00	03/09/15 10:25

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Lab Sample ID: 160-10788-1

Matrix: Filter

Client Sample ID: WAA-01-AF-PS-20150304

Date Collected: 03/04/15 11:15 Date Received: 03/09/15 10:25

Method: 9315 - Total Apha Radium (GFPC) Count **Total** Uncert. Uncert. Analyte Result Qualifier $(2\sigma + /-)$ $(2\sigma + 1 - 1)$ MDC Unit Prepared Analyzed Dil Fac Total Alpha Radium 0.402 V 0.393 0.394 1.00 0.630 pCi/Sample 03/13/15 09:41 03/22/15 19:15 Carrier **%Yield Qualifier** Limits Prepared Analyzed Dil Fac Ba Carrier 98.2 40 - 110 03/13/15 09:41 03/22/15 19:15

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) Count Total Uncert. Uncert. $(2\sigma + /-)$ (20+/-) RL MDC Unit Analyte Result Qualifier Prepared Analyzed Dil Fac Thorium-228 0.350 0.191 0.193 1.00 0.227 pCi/Sample 03/18/15 08:35 03/30/15 22:12 0.121 0.122 1.00 0.0548 pCi/Sample 03/18/15 08:35 03/30/15 22:12 Thorium-230 0.201 0.0363 1.00 0.0364 0.0545 pCi/Sample Thorium-232 0.0182 03/18/15 08:35 03/30/15 22:12 1 Tracer %Yield Qualifier Limits Prepared Analyzed Dil Fac Thorium-229 91.6 30 - 110 03/18/15 08:35 03/30/15 22:12

Total Count Uncert. Uncert. Result Qualifier $(2\sigma + /-)$ (20+/-) RL MDC Unit Prepared Analyzed Dil Fac Analyte 0.119 1.00 0.0588 pCi/Sample 03/18/15 08:35 03/30/15 22:09 0.118 Uranium-233/234 0.176 Uranium-235/236 0.0869 0.0871 1.00 03/18/15 08:35 03/30/15 22:09 0.0630 pCi/Sample 1.00 0.0678 0.0680 0.0587 pCi/Sample 03/18/15 08:35 03/30/15 22:09 Uranium-238 0.0587 1 Tracer **%Yield Qualifier** Limits Prepared Analyzed Dil Fac

30 - 110

Client Sample ID: WAA-02-AF-PS-20150304

90.4

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Date Collected: 03/04/15 10:24

Date Received: 03/09/15 10:25

Uranium-232

Lab Sample ID: 160-10788-2

03/30/15 22:09

03/18/15 08:35

Matrix: Filter

Method: 9315 - Total	Aprila Radiu	in (Grec)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Total Alpha Radium	0.236	ul	0.374	0.375	1.00	0.637	pCi/Sample	03/13/15 09:41	03/22/15 19:15	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Ba Carrier	97.3		40 - 110					03/13/15 09:41	03/22/15 19:15	

Method: A-01-R - Iso	topic Thoriu	m (Alpha S	Spectrometry)	1						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.389	7	0.197	0.199	1.00	0.218	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1
Thorium-230	0.338	J	0.163	0.166	1.00	0.122	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1
Thorium-232	0.111	7	0.0905	0.0909	1.00	0.0554	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1

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9 April 2915

TestAmerica St. Louis

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Client Sample ID: WAA-02-AF-PS-20150304 Date Collected: 03/04/15 10:24

Lab Sample ID: 160-10788-2

Date Received: 03/09/15 10:25

Matrix: Filter

Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	91.1		30 - 110					03/18/15 08:35	03/30/15 22 12	
Method: A-01-R - Iso	otopic Uraniu	m (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.132	uy	0.123	0.123	1.00	0.168	pCi/Sample	03/18/15 08:35	03/30/15 22:09	
Uranium-235/236	0.0670	บ 🧳	0.0924	0.0926	1.00	0.143	pCi/Sample	03/18/15 08:35	03/30/15 22:09	1
Uranium-238	0.0485	uU	0.0901	0.0902	1.00	0.168	pCi/Sample	03/18/15 08:35	03/30/15 22:09	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	81.3		30 - 110					03/18/15 08:35	03/30/15 22:09	

Client Sample ID: WAA-03-AF-PS-20150304

Date Collected: 03/04/15 11:04

Lab Sample ID: 160-10788-3

Matrix: Filter

ate Received: 03/09/	15 10:25						COMMENT OF SAME SAME			(W. and about
Method: 9315 - Total	Apha Radiu	m (GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Total Alpha Radium	0.338	W	0.356	0.357	1.00	0.575	pCi/Sample	03/13/15 09:41	03/22/15 19 15	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Ba Carrier	97.1		40 - 110					03/13/15 09:41	03/22/15 19:15	
Method: A-01-R - Iso	topic Thoriu	ım (Alpha S	pectrometry Count) Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 0+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Thorium-228	0.588	7	0.229	0.234	1.00	0.219	pCi/Sample	03/18/15 08:35	03/30/15 22:12	
Thorium-230	0.363	3	0.167	0.169	1.00	0,119	pCi/Sample	03/18/15 08:35	03/30/15 22:12	
Thorium-232	0.100	3	0.0893	0.0897	1.00	0.0994	pCi/Sample	03/18/15 08:35	03/30/15 22:12	
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Thorium-229	96.9		30 - 110					03/18/15 08:35	03/30/15 22:12	
Method: A-01-R - Iso	topic Uranii	ım (Alpha S	•	•						
			Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(2σ+/-)	(2σ+/-)	RL -	MDC		Prepared	Analyzed	Dit Fa
Uranium-233/234	0.202	3	0.127	0.128	1.00	0.105	pCi/Sample	03/18/15 08:35	03/30/15 22.09	
Uranium-235/236	0.0237		0.0474	0.0474	1.00	0.0711	pCi/Sample	03/18/15 08:35	03/30/15 22:09	
Uranium-238	0.144	7	0.109	0.109	1.00	0.105	pCi/Sample	03/18/15 08:35	03/30/15 22:09	
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Uranium-232	93.7		30 - 110					03/18/15 08:35	03/30/15 22:09	

HUG 9 Apr 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Client Sample ID: WAA-04-AF-PS-20150304

Date Collected: 03/04/15 10:53 Date Received: 03/09/15 10:25 Lab Sample ID: 160-10788-4

Matrix: Filter

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Total Alpha Radium	0.0849	M	0.356	0.357	(.00)	0.641	pCi/Sample	03/13/15 09:41	03/22/15 19:16	Diria
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Ba Carrier	102		40 - 110					03/13/15 09.41	03/22/15 19 16	
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Thorium-228	0.293	-5	0.190	0.192	1.00	0.250	pCi/Sample	03/18/15 08:35	03/30/15 22:12	
Thorium-230	0.176	3	0.123	0.124	1.00	0.126	pCi/Sample	03/18/15 08:35	03/30/15 22:12	
Thorium-232	0.0521	EL .	0.0753	0.0755	1.00	0,125	pCi/Sample	03/18/15 08:35	03/30/15 22:12	
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Thorium-229	90.6		30 - 110					03/18/15 08:35	03/30/15 22:12	
Method: A-01-R - Isc	topic Uraniu	ım (Alpha S	pectrometry)	í						
	•		Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Uranium-233/234	-0.0693	0	0.0909	0.0911	1.00	0.248	pCi/Sample	03/18/15 08:35	03/30/15 22:09	
Uranium-235/236	-0.100	U	0.101	0.101	1.00	0.301	pCi/Sample	03/18/15 08:35	03/30/15 22:09	,
Uranium-238	0.143	フ	0.108	0.109	1.00	0.104	pCi/Sample	03/18/15 08:35	03/30/15 22:09	f
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Uranium-232	92.1		30 - 110					03/18/15 08:35	03/30/15 22:09	
lient Sample ID:	WAA-05-A	F-PS-201	50304		(4.4 40.11.4 + 50)			Lab Sam	ple ID: 160-1	0788-5
ate Collected: 03/04	/15 10:36								Matri	x: Filte
ate Received: 03/09/										

			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.521		0.390	0.393	1,00	0.593	pCi/Sample	03/13/15 09:41	03/22/15 20:06	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	102		40 - 110					03/13/15 09:41	03/22/15 20 06	1
Analyte	Result		Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.260	W.	0.189	0.191	1.00	0.264	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1
Thorium-230	0.235	7	0.141	0.142	1.00	0.127	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1
Thorium-232	-0.0160	uci	0.0226	0.0227	1.00	0.126	pCi/Sample	03/18/15 08:35	03/30/15 22 12	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	88.3	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	30 - 110					03/18/15 08:35	03/30/15 22:12	1
			1 +	-	. /	15				

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TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Client Sample ID: WAA-05-AF-PS-20150304 Lab Sample ID: 160-10788-5

Date Collected: 03/04/15 10:36

Matrix: Filter

Date Received: 03/09/15 10:25

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0110	6	0.0408	0.0408	1.00	0.104	pCi/Sample	03/18/15 08:35	03/30/15 22:09	1
Uranium-235/236	0.000	W	0.0195	0.0195	1.00	0.0704	pCi/Sample	03/18/15 08:35	03/30/15 22:09	1
Uranium-238	0.0486		0.0670	0.0671	1.00	0.104	pCi/Sample	03/18/15 08:35	03/30/15 22:09	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	91.4		30 - 110					03/18/15 08:35	03/30/15 22 09	1

Client Sample ID: WAA-00-AF-FB-20150304

Date Collected: 03/04/15 00:00

Lab Sample ID: 160-10788-6 Matrix: Filter

Date Received: 03/09/15 10:25

Method: 9315 - Total	Apha Radiu	m (GFPC)								
	•	• •	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.171		0.311	0.312	1.00	0.540	pCi/Sample	03/13/15 09:41	03/22/15 20:06	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	99.7		40 - 110					03/13/15 09:41	03/22/15 20:06	1

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.377	7	0.203	0.205	1.00	0.233	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1
Thorium-230	0.120	4	0.115	0.115	1.00	0.160	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1
Thorium-232	0.0569	4	0.0671	0.0672	1.00	0.0592	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	86.5		30 - 110					03/18/15 08:35	03/30/15 22:12	1

Thorium-229	86.5		30 - 110					03/18/15 08:35	03/30/15 22:12	1
Method: A-01-R - Isotop	oic Uraniu	m (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0801	الخا	0.0956	0.0959	1.00	0.149	pCi/Sample	03/18/15 08:35	03/30/15 22 09	1
Uranium-235/236	0.000	M	0.0192	0.0192	1.00	0.0690	pCi/Sample	03/18/15 08:35	03/30/15 22:09	1
Uranium-238	0.0845	u	0,0839	0.0842	1.00	0.102	pCi/Sample	03/18/15 08:35	03/30/15 22:09	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	93.5		30 - 110					03/18/15 08:35	03/30/15 22:09	1

HUE 9 Am 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Method: 9315 - Total Apha Radium (GFPC)

Lab Sample ID: MB 160-178988/1-A

Matrix: Filter

Analysis Batch: 180374

Client Sample ID: Method Blank

Prep Type: Total/NA **Prep Batch: 178988**

			Count	i Otai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.2666	U	0.301	0.302	1.00	0.489	pCi/Sample	03/13/15 09:41	03/22/15 19:14	1

MB MB

Carrier %Yield Qualifier Limits Ba Carrier 86.4 40 - 110

Client Sample ID: Lab Control Sample

Analyzed

03/22/15 19:14

Prepared

03/13/15 09:41

Prep Type: Total/NA

Prep Batch: 178988

Lab Sample ID: LCS 160-178988/2-A

Matrix: Filter

Analysis Batch: 180374

				Total					
	Spike	LCS	LCS	Uncert.					%Rec.
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC L	Jnit	%Rec	Limits
Total Alpha	44.7	46.70		4.77	1.00	0.600 p	Ci/Samp	105	65 _ 150

Radium

LCS LCS

%Yield Qualifier Carrier Ba Carrier 40 - 110 88.8

Lab Sample ID: LCSD 160-178988/3-A

Matrix: Filter

Analysis Batch: 180374

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 178988

				Total						
	Spike	LCSD	LCSD	Uncert.				%Rec.		RER
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC Unit	%Rec	Limits	RER	Limit
Total Alpha	44.7	45.95		4.69	1.00	0.604 pCi/Samp	103	65 - 150	0.08	1

Radium

Carrier %Yield Qualifier Limits Ba Carrier 94.1 40 - 110

LCSD LCSD

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

90.8

Lab Sample ID: MB 160-179746/1-A

Matrix: Filter

Thorium-229

Analysis Batch: 182277

Client Sample ID: Method Blank	Client Sam	ole ID: Method	Blank
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03/18/15 08:35 03/30/15 22:12

Prep Type: Total/NA

Prep Batch: 179746

Alialysis balcii. I	02211								Frep Batch.	1/3/40
			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.2639		0.173	0.175	1.00	0.222	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1
Thorium-230	0.5389		0.202	0.207	1.00	0.0566	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1
Thorium-232	0.01877	U	0.0375	0.0376	1.00	0.0563	pCi/Sample	03/18/15 08:35	03/30/15 22:12	1
	МВ	MB								
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

30 - 110

TestAmerica St. Louis

Dil Fac

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-179746/2-A

Matrix: Filter

Analysis Batch: 182278

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 179746

Total LCS LCS %Rec. Spike Uncert. Analyte Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits Thorium-230 1.00 16.1 16.24 1.75 0.0561 pCi/Samp 101 81 - 118

LCS LCS

Tracer %Yield Qualifier I imits Thorium-229 96.0 30 - 110

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 179746

Lab Sample ID: LCSD 160-179746/3-A

Matrix: Filter

Analyte

Thorium-230

Analysis Batch: 182279

LCSD LCSD Spike

Added

16.1

Total Uncert.

 $(2\sigma + / -)$

1.75

1.00

Result Qual

16 23

RL MDC Unit

%Rec 101 0.150 pCi/Samp

%Rec. Limits RER 81 - 118

Limit 0

RER

LCSD LCSD Tracer %Yield Qualifier Limits 93.2 30 - 110 Thorium-229

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-179747/1-A

Lab Sample ID: LCS 160-179747/2-A

Matrix: Filter

Matrix: Filter

Uranium-233/23

Uranium-238

Analyte

Analysis Batch: 182266

Client Sample ID: Method Blank

Prep Type: Total/NA Prep Batch: 179747

Count Total мв мв Uncert. Uncert. MDC Unit Dil Fac Analyte Result Qualifier RL $(2\sigma + / -)$ $(2\sigma + / -)$ Prepared Analyzed Uranium-233/234 0.09825 U 0.106 0.106 1.00 0.153 pCi/Sample 03/18/15 08:35 03/30/15 22:09 Uranium-235/236 0.04075 U 0.0759 0.0760 1.00 0.142 pCi/Sample 03/18/15 08:35 03/30/15 22:09 Uranium-238 0.06537 0.0861 0.0863 1.00 0.136 pCi/Sample 03/18/15 08:35 03/30/15 22:09

> MR MR

Qualifier Tracer %Yield Limits 30 - 110 Uranium-232 86.0

03/18/15 08:35 03/30/15 22:09

93

Prepared

Client Sample ID: Lab Control Sample

82 - 122

Analyzed

Prep Type: Total/NA

Dil Fac

Prep Batch: 179747

Analysis Batch: 182267

26.0

24.16

Total

2.46

Spike LCS LCS Uncert. %Rec. Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits 25.5 24.11 2.46 1.00 0.112 pCi/Samp 95 84 - 120

1.00

0.133 pCi/Samp

LCS LCS

Qualifier Tracer %Yield Limits 86.7 30 - 110 Uranium-232

TestAmerica St. Louis

QC Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

30 - 110

Lab Sample ID: LCSD 160-179747/3-A

85.5

Matrix: Filter

Uranium-232

Analysis Batch: 182268

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

Prep Batch: 179747

						Total							
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Uranium-233/23			25.5	24.12		2.46	1.00	0.132	pCi/Samp	95	84 - 120	0	1
4 Uranium-238			26.0	25.76		2.60	1.00	0.132	pCi/Samp	99	82 - 122	0.32	1
	LCSD	LCSD											
Tracer	%Yield	Qualifier	Limits										

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4.0

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10788-1

Rad

Prep Batch: 178988

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10788-1	WAA-01-AF-PS-20150304	Total/NA	Filter	DPS-0	
160-10788-2	WAA-02-AF-PS-20150304	Total/NA Filter		DPS-0	
160-10788-3	WAA-03-AF-PS-20150304	Total/NA	Filter	DPS-0	
160-10788-4	WAA-04-AF-PS-20150304	Total/NA	Filter	DPS-0	
160-10788-5	WAA-05-AF-PS-20150304	Total/NA	Filter	DPS-0	
160-10788-6	WAA-00-AF-FB-20150304	Total/NA	Filter	DPS-0	
LCS 160-178988/2-A	Lab Control Sample	Total/NA	Filter	DPS-0	
LCSD 160-178988/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0	
MB 160-178988/1-A	Method Blank	Total/NA	Filter	DPS-0	

Prep Batch: 179746

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10788-1	WAA-01-AF-PS-20150304	Total/NA	Filter	ExtChrom	_
160-10788-2	WAA-02-AF-PS-20150304	Total/NA	Filter	ExtChrom	
160-10788-3	WAA-03-AF-PS-20150304	Total/NA	Filter	ExtChrom	
160-10788-4	WAA-04-AF-PS-20150304	Total/NA	Filter	ExtChrom	
160-10788-5	WAA-05-AF-PS-20150304	Total/NA	Filter	ExtChrom	
160-10788-6	WAA-00-AF-FB-20150304	Total/NA	Filter	ExtChrom	
LCS 160-179746/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-179746/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-179746/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 179747

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10788-1	WAA-01-AF-PS-20150304	Total/NA	Filter	ExtChrom	-
160-10788-2	WAA-02-AF-PS-20150304	Total/NA	Filter	ExtChrom	
160-10788-3	WAA-03-AF-PS-20150304	Total/NA	Filter	ExtChrom	
160-10788-4	WAA-04-AF-PS-20150304	Total/NA	Filter	ExtChrom	
160-10788-5	WAA-05-AF-PS-20150304	Total/NA	Filter	ExtChrom	
160-10788-6	WAA-00-AF-FB-20150304	Total/NA	Filter	ExtChrom	
LCS 160-179747/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-179747/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-179747/1-A	Method Blank	Total/NA	Filter	ExtChrom	

TestAmerica Job ID: 160-10788-1

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-10788-1	WAA-01-AF-PS-20150304	98.2	
160-10788-2	WAA-02-AF-PS-20150304	97.3	
160-10788-3	WAA-03-AF-PS-20150304	97.1	
160-10788-4	WAA-04-AF-PS-20150304	102	
160-10788-5	WAA-05-AF-PS-20150304	102	
160-10788-6	WAA-00-AF-FB-20150304	99.7	
LCS 160-178988/2-A	Lab Control Sample	88.8	
LCSD 160-178988/3-A	Lab Control Sample Dup	94.1	
	Method Blank	86.4	

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Th-229	
Lab Sample ID	Client Sample ID	(30-110)	
160-10788-1	WAA-01-AF-PS-20150304	91.6	
160-10788-2	WAA-02-AF-PS-20150304	91.1	
160-10788-3	WAA-03-AF-PS-20150304	96.9	
160-10788-4	WAA-04-AF-PS-20150304	90.6	
160-10788-5	WAA-05-AF-PS-20150304	88.3	
160-10788-6	WAA-00-AF-FB-20150304	86.5	
LCS 160-179746/2-A	Lab Control Sample	96.0	
LCSD 160-179746/3-A	Lab Control Sample Dup	93.2	
MB 160-179746/1-A	Method Blank	90.8	
Tracer/Carrier Legend			

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		U-232	
Lab Sample ID	Client Sample ID	(30-110)	
160-10788-1	WAA-01-AF-PS-20150304	90.4	
160-10788-2	WAA-02-AF-PS-20150304	81.3	
160-10788-3	WAA-03-AF-PS-20150304	93.7	
160-10788-4	WAA-04-AF-PS-20150304	92.1	
160-10788-5	WAA-05-AF-PS-20150304	91.4	
160-10788-6	WAA-00-AF-FB-20150304	93.5	
LCS 160-179747/2-A	Lab Control Sample	86.7	
LCSD 160-179747/3-A	Lab Control Sample Dup	85.5	
MB 160-179747/1-A	Method Blank	86.0	
Tracer/Carrier Legend			
U-232 = Uranium-232			

TestAmerica St. Louis

Page 18 of 18

4/8/2015

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 20, 2015
Sample Delivery Group (SDG):	J10908
Sample Numbers:	WAA-04-AF-PS-20150313 and WAA-00-AF-FB-20150313
Matrix / Number of Samples:	1 Air Sample and 1 Field Blank
documents entitled "Contract Labor Methods Data Review" (9240.1-48) Packages from Subcontracted Labor Agency Radiological Laboratory A criteria specified in the applicable rules The review was intended to identify apparent from the summary data pathat were found, and data qualificat limited to the available field and lal package.	y problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data
	alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Ell	كال عال عال عال عال عال عال عال عال عال ع
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10908 included one (1) environmental air (filter) sample and one (1) QC samples (a field blank). Samples were analyzed for gross alpha and beta radiation by EPA SW-846 Method 9310 and for cesium-137 and other gamma-emitters by Department of Energy (DOE) Method Ga-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. LCS and duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded no detectable activities and the field blank low alpha and beta activities. The field sample yielded more than 5 times the field blank beta activity, so no qualifications were applied for that. However, the field sample alpha activity was very similar to that of the field blank, so it was qualified as an artifact and flagged "U".

IV. Laboratory Control Sample (LCS)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

V. Surrogates

Surrogates are not used in these radioanalytical methods.

VI. Comments

Some detected activities were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with no significant qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10908-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher



Authorized for release by: 3/27/2015 4:57:48 PM

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com

····· Links ·····

Review your project results through

Total Access

Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10908-1

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-1

Job ID: 160-10908-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10908-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 3/17/2015 2:05 PM; the samples arrived in good condition, properly preserved. The temperature of the cooler at receipt was 20.0° C.

GROSS ALPHA AND GROSS BETA RADIOACTIVITY

Samples WAA-04-AF-PS-20150313 (160-10908-1) and WAA-00-AF-FB-20150313 (160-10908-2) were analyzed for Gross Alpha and Gross Beta Radioactivity in accordance with SW846 9310. The samples were prepared and analyzed on 03/18/2015.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

RADIUM-226 & OTHER GAMMA EMITTERS (GS)

Samples WAA-04-AF-PS-20150313 (160-10908-1) and WAA-00-AF-FB-20150313 (160-10908-2) were analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with GA-01-R. The samples were prepared and analyzed on 03/18/2015.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-1

Job ID: 160-10908-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

TestAmerica St. Louis

Chain of Custody Record

TestAmerico

13715 Rider Trail North

Earth City, MO 63045 phone 314.298.8566 fax	Regul	atory Pro	gram: Г	low [NPDES	Г	RCRA	A		ther:								TestAmerica L	aboratories, Inc.
Client Contact		anager: D				_	Con		-	-	inro	th	Date: 3	3-17-15				COC No:	
Tetra Tech, Inc.		314-517-67				Lab	Cont	tact	: Mi	ke F	rank	s	Carrie					1 of 1	COCs
415 Oak Street	1	Analysis Ti	ırnaround	Time		T	1		П	T	T	T	TIT	П				Sampler:	
Kansas City, MO 64106	CALEND	AR DAYS	✓ WOR	CING DAYS	3						1				1 1		11	For Lab Use Only	:
(816) 412-1786 Phone	TAT	if different from	n Below	20		2					10	5						Walk-in Client:	
(816) 816-410-1748 FAX		2			2 3	a		Radium	E	티							Lab Sampling:		
Project Name: West Lake Landfill Site		1	week			> 2		beo	Sad	ori	Uranium 226 (GEP	5							
Site: Bridgeton, MO		2	days			Also (Y	ha/	n S	ha	F =	5 8	77						Job / SDG No.:	
PO# 1105610		1	day			Sample (Y/N	Z Z	ami	₽ B	ido	do I	5							
			Sample			S	Gross	RG	gal	Sol	Isotopic I	l ac				- 1			
	Sample	Sample	Type		#of	ž ž	0 0	6	5 T	太口	χ Ε	2							
Sample Identification	Date	Time	(C=Comp, G=Grab)	Matrix		Filtered 9	9310	GA-01-R Gamm Spec	9315 Total Alpha	A-01-R Isotopic Thorium	#-01-K Isotopic Uranium * 9315 Radium-226 (GFPC)	8			1			Sample Spe	ecific Notes:
0	3/13/15	0:00	Filter	Air	1	П	X	Х	Х		x >	X						* 9315 Radium-226	G(GFPC)
0	1/0/00	0:00	Filter	Air	1	IT	×	X	x	X	x >	x						contingent upon TA	
0	1/0/00	0:00	Filter	Air	1	П	x	x			x >	x			\prod			for all samples	
WAA-04-AF-PS-20150313	3/13/15	10:10	Filter	Air	1	П	X	X	x	x	x >	x							,
ا ت	1/0/00	0:00	Filter	Air	1	П	×	x	X	Х	x >	x							60
WAA-00-AF-FB-20150313	3/13/15	NA	Filter	Air	1		X	x			x >	x T		TT	\Box	1			0908
						П						T		TT	\sqcap				S Ch
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A CONTRACT OF THE CONTRACT OF							T	T	П	\sqcap	\top	\dagger			11		11		
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5-	NaOH: 6=	Other																	
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please Comments Section if the lab is to dispose of the sample.			odes for the	e sample	in the	8	Samp	ole C	Dispo	osal	(Afe	ee m	nay be asses	ssed if	samp	les ar	e retain	ned longer than 1 m	
✓Non-Hazard ☐Flammable ☐Skin Irritant	Poison	В	Unkno	wn				Retur	n to C	lient			☐Disposal by	Lab		□Arcl	ive for	Months	
Special Instructions/QC Requirements & Comments:																			
	-										and a side	-17						4	*
Custody Seals Intact: Yes No	Custody 8						A		_	oler 1	emp	o. (°C	:): Obs'd:	_	Corr'd	l:		Therm ID No.:	
Relinquished by: Tway Boulson	Company		ech	Date/T	me: IS I	165	Recei	ved	by:	la	il	0	,	Comp	~ -	51C		Date/Time: 3.17.15	1405
Relinquished by:	Company			Date/T			Recei	ved					,,,,	Comp				Date/Time:	
Relinquished by:	Company		14 14 14 14	Date/T	ime:	Ī	Recei	ved	in La	abora	atory	by:		Comp	any:	· 1		Date/Time:	

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Job Number: 160-10908-1

Login Number: 10908

List Source: TestAmerica St. Louis

List Number: 1 Creator: Clarke, Jill C

Client: Tetra Tech EM Inc.

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

3/27/2015

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Minimum Level (Dioxin)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Not Calculated

Quality Control Relative error ratio TestAmerica Job ID: 160-10908-1

Qualifiers

Rad

ML

NC

ND PQL

QC

RER RL

RPD

TEF

TEQ

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Oil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC .	Minimum detectable concentration
MDL	Method Detection Limit

TestAmerica St. Louis

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-1

Method	Method Description	Protocol	Laboratory
9310	Gross Alpha / Beta (GFPC)	SW846	TAL SL
GA-01-R	Cesium-137 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10908-1	WAA-04-AF-PS-20150313	Filter	03/13/15 10:10	03/17/15 14:05
160-10908-2	WAA-00-AF-FB-20150313	Filter	03/13/15 00:00	03/17/15 14:05

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R

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Client Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-1

Client Sample ID: WAA-04-AF-PS-20150313 Lab Sample ID: 160-10908-1 Date Collected: 03/13/15 10:10

Date Received: 03/17/15 14:05

Matrix: Filter

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.412	4	0,260	0.264	10.0	0.327	pCi/Sample	03/18/15 12:42	03/18/15 13.15	1
Gross Beta	17.6		1.17	2.11	10.0	0.421	pCi/Sample	03/18/15 12:42	03/18/15 13:15	1
Method: GA-01-R -	Cesium-137 8	Other Gan	nma Emitters	(GS)						
			Count	Total						
			Count	IOLAI						
			Uncert.	Uncert.						
Analyte	Result	Qualifier			RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result -0.120	Qualifier	Uncert.	Uncert.	RI 20.0	MDC 7.55	Unit pCi/Sample	Prepared 03/18/15 12:55	Analyzed 03/18/15 20:51	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						Dil Fac
Cesium-137			Uncert. (2σ+/-) 3.96	Uncert. (2σ+/-) 3.96						Dil Fac
Analyte Cesium-137 Other Detected Radionuclides	-0.120		Uncert. (2σ+/-) 3.96 Count	Uncert. (2σ+/-) 3.96			pCi/Sample			Dil Fac

Client Sample ID: WAA-00-AF-FB-20150313

Method: 9310 - Gross Alpha / Beta (GFPC)

Date Collected: 03/13/15 00:00 Date Received: 03/17/15 14:05 Lab Sample ID: 160-10908-2

Matrix: Filter

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.321	7	0.234	0.237	10.0	0.309	pCi/Sample	03/18/15 12:43	03/18/15 13:15	1
Gross Beta	1.99	3	0.440	0.482	10.0	0.397	pCi/Sample	03/18/15 12:43	03/18/15 13:15	-1
									*	
Method: GA-01-R - 0	Cesium-137 8	Cother Gan	nma Emitters	(GS)						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	5,50	W	5.35	5.38	20.0	8.37	pCi/Sample	03/18/15 12:55	03/18/15 20:51	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/Sample	03/18/15 12:55	03/18/15 20:51	1

HUE 29 April 2015

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Method: 9310 - Gross Alpha / Beta (GFPC)

Lab Sample ID: MB 160-179800/1-A

Matrix: Filter

Analysis Batch: 179770

Client Sample ID: Method Blank

Prep Type: Total/NA **Prep Batch: 179800**

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.1293	U	0.186	0.186	10.0	0.316	pCi/Sample	03/18/15 12:42	03/18/15 13:15	1
Gross Beta	-0.01264	U	0.180	0.180	10.0	0.356	pCi/Sample	03/18/15 12:42	03/18/15 13:15	1

Lab Sample ID: LCS 160-179800/2-A

Matrix: Filter

Analysis Batch: 179770

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 179800

				Total						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Gross Alpha	5.36	5.672		1.03	10.0	0.352	pCi/Samp	106	75 - 125	

Lab Sample ID: LCSB 160-179800/3-A

Matrix: Filter

Analysis Batch: 179770

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 179800

				Total						
	Spike	LCSB	LCSB	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Gross Beta	17.8	17.99		2.15	10.0	0.370	pCi/Samp	101	75 - 125	

Lab Sample ID: 160-10908-1 DU

Matrix: Filter

Analysis Batch: 179770

Client Sample ID: WAA-04-AF-PS-20150313

Prep Type: Total/NA

Prep Batch: 179800

					Total						
	Sample	Sample	DU	DU	Uncert.						RER
Analyte	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit		RER	Limit
Gross Alpha	0.412		0.5968		0.301	10.0	0.316	pCi/Samp		0.33	1
Gross Beta	17.6		18.46		2.19	10.0	0.356	pCi/Samp		0.20	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-179804/1-A Client Sample ID: Method Blank

Matrix: Filter

Prep Type: Total/NA **Prep Batch: 179804** Analysis Batch: 179636

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	1.810	U	3.63	3.63	20.0	6.40	pCi/Sample	03/18/15 12:55	03/18/15 21:25	1
			Count	Total						
Other Detected	MB	MB	Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	03/18/15 12:55	03/18/15 21:25	1
Radionuclide										

QC Sample Results

Client: Tetra Tech EM Inc.

Matrix: Filter

Matrix: Filter

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCS 160-179804/2-A

Lab Sample ID: 160-10908-1 DU

TestAmerica Job ID: 160-10908-1

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

Analysis Batch: 1/9/1/									Prep Bat	cn: 1/980
				Total						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Americium-241	32000	31580		3280		118	pCi/Samp	99	87 - 116	
Cesium-137	11100	10870		1140	20.0	58.9	pCi/Samp	98	87 - 120	
Cobalt-60	11500	11290		1140		46.9	pCi/Samr	98	87 - 115	

Client Sample ID: WAA-04-AF-PS-20150313

Prep Type: Total/NA

Analysis Batch	n: 179720								Prep	Batch: 1	79804
					Total						
	Sample	Sample	DU	DU	Uncert.						RER
Analyte	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit		RER	Limit
Cesium-137	-0.120	U	0.0000	U	3.86	20.0	9.47	pCi/Samp	 -	0.02	1
					Total						
Other Detected	Sample	Sample	DU	DU	Uncert.						RER
Radionuclides	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit		RER	Limit
Be-7	107		164.6		54.9		40.9	pCi/Samp	 	0.55	1

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-1

Rad

Prep Batch: 179800

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10908-1	WAA-04-AF-PS-20150313	Total/NA	Filter	None	
160-10908-1 DU	WAA-04-AF-PS-20150313	Total/NA	Filter	None	
160-10908-2	WAA-00-AF-FB-20150313	Total/NA	Filter	None	
LCS 160-179800/2-A	Lab Control Sample	Total/NA	Filter	None	
LCSB 160-179800/3-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-179800/1-A	Method Blank	Total/NA	Filter	None	

Prep Batch: 179804

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10908-1	WAA-04-AF-PS-20150313	Total/NA	Filter	None	
160-10908-1 DU	WAA-04-AF-PS-20150313	Total/NA	Filter	None	
160-10908-2	WAA-00-AF-FB-20150313	Total/NA	Filter	None	
LCS 160-179804/2-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-179804/1-A	Method Blank	Total/NA	Filter	None	

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Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 20, 2015
Sample Delivery Group (SDG):	J10908
Sample Numbers:	WAA-04-AF-PS-20150313 and WAA-00-AF-FB-20150313
Matrix / Number of Samples:	1 Air Sample and 1 Field Blank
documents entitled "Contract Labor Methods Data Review" (9240.1-48) Packages from Subcontracted Labor Agency Radiological Laboratory Arcriteria specified in the applicable number of the review was intended to identify apparent from the summary data parthat were found, and data qualificate limited to the available field and lab package. I, Harry Ellis, certify that all data variables.	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date
Columbia by Hully Ellis, Chemist	Duic

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10908 included one (1) environmental air (filter) sample and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and uranium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) and field blanks yielded low activities for one (of three) thorium isotopes and for none (of three) uranium isotopes. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J"). In the total alpha radium analysis, low sample volumes and high background counts led to some samples (including some laboratory QC samples) yielding minimum detectable concentrations above the reporting limit. No qualifications were applied for this, but data users should note that these results are not fully comparable with those from other sampling events.

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10908-2

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Elizabeth M. Houcheur

Authorized for release by: 4/15/2015 11:01:28 AM Elizabeth Hoerchler, Project Mgmt. Assistant elizabeth.hoerchler@testamericainc.com

Designee for

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com

LINKS

Review your project results through
Total Access

Have a Question?



Visit us at:www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10908-2

Table of Contents

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-2

Job ID: 160-10908-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10908-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 03/17/2015; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 20.0° C.

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-04-AF-PS-20150313 (160-10908-1) and WAA-00-AF-FB-20150313 (160-10908-2) were analyzed for Total Alpha Radium (GFPC) in accordance with SW- 846 Method 9315. The samples were prepared on 03/26/2015 and analyzed on 03/30/2015.

The following samples are filters that were split between multiple analyses: WAA-04-AF-PS-20150313 (160-10908-1) and WAA-00-AF-FB-20150313 (160-10908-2). Insufficient sample volume was available to perform a sample duplicate (DUP). A LCS/LCSD was performed.

The total alpha emitting radium detection goal was not met for the following sample due to insufficient sample available for analysis. The sample is a filter split among multiple analyses: WAA-00-AF-FB-20150313 (160-10908-2). Analytical results are reported with the

Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-2

Job ID: 160-10908-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

detection limit achieved.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples WAA-04-AF-PS-20150313 (160-10908-1) and WAA-00-AF-FB-20150313 (160-10908-2) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 03/26/2015 and analyzed on 04/01/2015.

Prep batch 181584

Insufficient sample volume was available to perform a sample duplicate (DUP) associated with batch 181584. The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate. WAA-04-AF-PS-20150313 (160-10908-1) and WAA-00-AF-FB-20150313 (160-10908-2)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-04-AF-PS-20150313 (160-10908-1) and WAA-00-AF-FB-20150313 (160-10908-2) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 03/26/2015 and analyzed on 04/01/2015.

Prep batch 181586

Insufficient sample volume was available to perform a sample duplicate (DUP) associated with batch 181586. The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate. WAA-04-AF-PS-20150313 (160-10908-1) and WAA-00-AF-FB-20150313 (160-10908-2).

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis 4/15/2015

TestAmerica St. Louis

Chain of Custody Record

TestAmerica
The LEADER IN ENVIRONMENTAL TESTING

13715 Rider Trail North

Earth City, MO 63045 phone 314.298.8566 fax	Regul	atory Pro	gram:	DW [NPDES		RCR.	A		Other:										TestAmerica La	boratories, Inc.
Client Contact			ave Kinrot			No.	Con	tact	: Da	ave K	inrot	h	Da	te: 3-	17-15	_				COC No:	1
Tetra Tech, Inc.		314-517-67									ranks			rrier:						1 of 1	COCs
415 Oak Street	-	Analysis Ti	ırnaround	Time	3.00.000	П	T			T	\top	П		П	\top				T	Sampler:	
Kansas City, MO 64106	CALENE	AR DAYS	✓ WOR	CING DAYS	3	1						1 1				1 1				For Lab Use Only:	
(816) 412-1786 Phone	TAT	if different from	n Below	20		1 2					6	1								Walk-in Client:	
(816) 816-410-1748 FAX			weeks			23			un.	E 1	티보	1			1			-		Lab Sampling:	
Project Name: West Lake Landfill Site			week			> 2	Bet	bec	Rad	oric	3 (G										
Site: Bridgeton, MO		2	days			e e	ha/	n S	ha	E	5 8									Job / SDG No.:	
PO# 1105610			day			Sample (9310 Gross Alpha/Beta	amr	9315 Total Alpha Radium	A-01-R Isotopic Thorium	A-U1-K Isotopic Uranium * 9315 Radium-226 (GFPC)										
			Sample			Sa	SSOL	R G	otal	Isot	Sol Sol				1						
	Sample	Sample	Type		#of	Ja d	90	9	57	中日	ا ا				1						
Sample Identification	Date	Time	(C=Comp, G=Grab)	Matrix	Cont	FILE	331	A-A	331	0-0	* 9315	1			l			- 1		Sample Spec	cific Notes:
						Ħ	Ħ	Ť	-	Ħ	Ť		_	H	=	+		+	+		
0	3/13/15	0:00	Filter	Air	1	LL	X	X	X	X .	X X								1_	* 9315 Radium-226	(GFPC)
0	1/0/00	0:00	Filter	Air	1		X	x	x	X	$x \mid x$									contingent upon TA	R results
0	1/0/00	0:00	Filter	Aìr	1	П	Х	х	X	X	x x									for all samples	
WAA-04-AF-PS-20150313	3/13/15	10:10	Filter	Air	1	П	X	X	X	x	хх								T		
0	1/0/00	0:00	Filter	Air	1	П	X	X	X		хx	П		\Box				\top	1		ő
WAA-00-AF-FB-20150313	3/13/15	NA NA	Filter	Air	1	Ħ	X	X			XX				\top	\forall		\top	\dagger		090
0 WAA-00-AF-FB-20130313	3/13/13	INA	FRIEI	All		H	 ^	r	r	1	7	H		H	+	\forall		+	+		0
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Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5-	NaOH: 6=	Other																			
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please! Comments Section if the lab is to dispose of the sample.	_ist any EP	A Waste C	odes for the	e sample	in the		Samp	ole C	Disp	osal	(A fe	e may	y be a	sess	ed if	samp	oles	are re	etaine	ed longer than 1 n	
✓Non-Hazard ☐Flammable ☐Skin Irritant	Poison	В	Unkno	wn		\dashv		Retur	n to C	Client		Е	Dispos	al by La	ab		ПА	rchive	for	Months	
Special Instructions/QC Requirements & Comments:	****						7 11 10				-	-			-				-		
Custody Seals Intact: Yes No	Custody 8	Seal No.:							Co	oler T	Temp.	(°C):	Obs'd:			Corr'd	d:		7	herm ID No.:	
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Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Client: Tetra Tech EM Inc. Job Number: 160-10908-2

List Source: TestAmerica St. Louis

Login Number: 10908 List Number: 1 Creator: Clarke, Jill C

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.
G	The Sample MDC is greater than the requested RL.

Glossary

ND

PQL

QC

RER

RPD

TEF

TEQ

RL

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ΛL	Minimum Level (Dioxin)
NC	Not Calculated

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)
Toxicity Equivalent Quotient (Dioxin)

Quality Control

Relative error ratio

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-2

Method	Method Description	Protocol	Laboratory
9315	Total Apha Radium (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10908-1	WAA-04-AF-PS-20150313	Filter	03/13/15 10:10	03/17/15 14:05
160-10908-2	WAA-00-AF-FB-20150313	Filter	03/13/15 00:00	03/17/15 14:05

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Client Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-2

Client Sample ID: WAA-04-AF-PS-20150313

Date Collected: 03/13/15 10:10 Date Received: 03/17/15 14:05

Lab Sample ID: 160-10908-1

Matrix: Filter

			Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Total Alpha Radium	0.402	W	0.525	0.526	1.00	0.876	pCi/Sample	03/26/15 15:20	03/30/15 14:23	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Ba Carrier	97.9		40 - 110					03/26/15 15:20	03/30/15 14:23	
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Thorium-228	0.118	W	0.159	0.159	(1.00)	0.267	pCi/Sample	03/26/15 14:39	04/01/15 10:32	
Thorium-230	0.234	J	0.146	0.148	1.00	0.147	pCi/Sample	03/26/15 14:39	04/01/15 10:32	
Thorium-232	0.0818	W	0.0917	0.0919	1.00	0.132	pCi/Sample	03/26/15 14:39	04/01/15 10:32	
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Thorium-229	88.8		30 - 110					03/26/15 14:39	04/01/15 10 32	
Method: A-01-R - Iso	topic Uraniu	ım (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
			••							
		Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
	Result 0.00469			(2 0+/-) 0.0885	1.00	MDC 0.199	Unit pCi/Sample	Prepared 03/26/15 14:39	Analyzed 04/01/15 10:25	Dil Fa
Uranium-233/234		(U)	(2σ+/-)					-		
Uranium-233/234 Uranium-235/236	0.00469	(U)	(2 0+/-) 0.0885	0.0885	1.00	0.199	pCi/Sample	03/26/15 14:39	04/01/15 10:25	
Analyte Uranium-233/234 Uranium-235/236 Uranium-238 Tracer	0.00469 0.00389 0.0219	y	(2 0+/-) 0.0885 0.0542	0.0885 0.0542	1.00	0.199 0.154	pCi/Sample pCi/Sample	03/26/15 14:39 03/26/15 14:39	04/01/15 10:25 04/01/15 10:25	

Date Collected: 03/13/15 00:00

Date Received: 03/17/15 14:05

Matrix: Filter

Method: 9315 - Total	Apha Radiu	m (GFPC)							
	•		Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.175	UG	0.724	0.724	1.00	1.30 pCi/Sample	03/26/15 15:20	03/30/15 14:24	1
Carrier	%Yield	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Ba Carrier	97.9		40 - 110				03/26/15 15:20	03/30/15 14 24	1

Method: A-01-R - Isote	opic Thoriu	ım (Alpha S	pectrometry)						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.118	4	0.128	0.128	1.00	0.199	pCi/Sample	03/26/15 14:39	04/01/15 10:32	1
Thorium-230	0.572	.)	0.215	0.221	1.00	0.152	pCi/Sample	03/26/15 14:39	04/01/15 10:32	1
Thorium-232	0.0556	y	0.0734	0.0735	(.00)	0.113	pCi/Sample	03/26/15 14:39	04/01/15 10 32	1

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Client Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-2

Lab Sample ID: 160-10908-2

Prepared

03/26/15 14.39

Matrix: Filter

Analyzed

04/01/15 10:25

Dil Fac

Client Sample ID: WAA-00-AF-FB-20150313

%Yield Qualifier

92.0

Limits

30 - 110

Date Collected: 03/13/15 00:00 Date Received: 03/17/15 14:05

Tracer

Uranium-232

Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	86.1		30 - 110					03/26/15 14:39	04/01/15 10:32	1
Method: A-01-R - Is	otopic Uraniu	ım (Alpha S	pectrometry))						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.117	CU/	0.109	0.109	1.00	0.149	pCi/Sample	03/26/15 14:39	04/01/15 10:25	1
Uranium-235/236	0.0134	U	0.0498	0.0498	1.00	0.127	pCi/Sample	03/26/15 14:39	04/01/15 10:25	1
Uranium-238	0.0584	41	0.0769	0.0770	1.00	0,121	pCi/Sample	03/26/15 14:39	04/01/15 10 25	1

HVE 20 Am 15

Lab Sample ID: 160-10908-1

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Client Sample ID: WAA-04-AF-PS-20150313

Date Collected: 03/13/15 10:10 **Matrix: Filter**

Date Received: 03/17/15 14:05

Method: 9315 - Total Apha Radium (GFPC) Count Total Uncert. Uncert. Analyte Result Qualifier $(2\sigma + / -)$ $(2\sigma + / -)$ RL MDC Unit Prepared Analyzed Dil Fac Total Alpha Radium 0.402 Ū 0.525 0.526 1.00 0.876 pCi/Sample 03/26/15 15:20 03/30/15 14:23 Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac Ba Carrier 97.9 40 - 110 03/26/15 15:20 03/30/15 14:23

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) Count Total Uncert. Uncert. Analyte Result Qualifier RL **MDC** Unit Prepared Analyzed $(2\sigma + / -)$ $(2\sigma + / -)$ Dil Fac Thorium-228 0.118 Ū 0.159 0.159 1.00 0.267 pCi/Sample 03/26/15 14:39 04/01/15 10:32 0.146 0.148 1.00 pCi/Sample 03/26/15 14:39 04/01/15 10:32 Thorium-230 0.147 0.234 Thorium-232 0.0818 U 0.0917 0.0919 1.00 0.132 pCi/Sample 03/26/15 14:39 04/01/15 10:32 Qualifier Dil Fac Tracer %Yield Limits Prepared Analyzed Thorium-229 88.8 30 - 110 03/26/15 14:39 04/01/15 10:32

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) Count Total Uncert. Uncert. Result Qualifier MDC Unit Dil Fac Analyte $(2\sigma + / -)$ $(2\sigma + / -)$ RL Prepared Analyzed Ū 0.0885 0.0885 1.00 pCi/Sample 03/26/15 14:39 04/01/15 10:25 Uranium-233/234 0.00469 0.199 Uranium-235/236 0.00389 0.0542 U 0.0542 1.00 0.154 pCi/Sample 03/26/15 14:39 04/01/15 10:25 Uranium-238 U 0.0574 0.0574 0.123 pCi/Sample 03/26/15 14:39 04/01/15 10:25 0.0219 1.00 Tracer Limits Prepared %Yield Qualifier Analyzed Dil Fac 30 - 110 03/26/15 14:39 Uranium-232 89.9 04/01/15 10:25

Client Sample ID: WAA-00-AF-FB-20150313

Lab Sample ID: 160-10908-2 Date Collected: 03/13/15 00:00 Matrix: Filter

Date Received: 03/17/15 14:05

Method: 9315 - Total	Apha Radiu	ım (GFPC)								
	•	, ,	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.175	U G	0.724	0.724	1.00	1.30	pCi/Sample	03/26/15 15:20	03/30/15 14:24	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	97.9		40 - 110					03/26/15 15:20	03/30/15 14:24	1

Method: A-01-R - Iso	topic Thoriu	ım (Alpha S	Spectrometry))						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.118	U	0.128	0.128	1.00	0.199	pCi/Sample	03/26/15 14:39	04/01/15 10:32	1
Thorium-230	0.572		0.215	0.221	1.00	0.152	pCi/Sample	03/26/15 14:39	04/01/15 10:32	1
Thorium-232	0.0556	U	0.0734	0.0735	1.00	0.113	pCi/Sample	03/26/15 14:39	04/01/15 10:32	1

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TestAmerica Job ID: 160-10908-2

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-181584/2-A Client Sample ID: Lab Control Sample **Matrix: Filter** Prep Type: Total/NA Analysis Batch: 182948 **Prep Batch: 181584** Total

LCS LCS %Rec. Spike Uncert. Analyte Added Result (2σ+/-) RL MDC Unit %Rec Limits Thorium-230 1.00 16.1 17.58 1.87 0.124 pCi/Samp 109 81 - 118

LCS LCS Tracer %Yield Qualifier I imits Thorium-229 92.2 30 - 110

Lab Sample ID: LCSD 160-181584/3-A

Matrix: Filter

Analysis Batch: 182949

Prep Batch: 181584 Total LCSD LCSD RER Spike Uncert. %Rec. Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits RER Limit Thorium-230 16.1 1.75 1.00 103 16 51 0.115 pCi/Samp 81 - 118 0.30

LCSD LCSD Tracer %Yield Qualifier Limits 30 - 110 Thorium-229 94.5

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-181586/1-A Client Sample ID: Method Blank **Matrix: Filter** Prep Type: Total/NA

Analysis Batch: 182913

Prep Batch: 181586 Count Total мв мв Uncert. Uncert. Analyte Result Qualifier RL MDC Unit $(2\sigma + / -)$ $(2\sigma + / -)$ Prepared Analyzed Dil Fac Uranium-233/234 0.01876 U 0.0375 0.0376 1.00 0.0563 pCi/Sample 03/26/15 14:39 04/01/15 10:25 Uranium-235/236 0.0000 U 0.0195 0.0195 1.00 0.0700 pCi/Sample 03/26/15 14:39 04/01/15 10:25 Uranium-238 0.05618 U 0.0649 0.0650 1.00 0.0562 pCi/Sample 03/26/15 14:39 04/01/15 10:25 MR MR

Qualifier Limits Tracer %Yield Prepared Analyzed Dil Fac 04/01/15 10:25 92.3 30 - 110 03/26/15 14:39 Uranium-232

Lab Sample ID: LCS 160-181586/2-A

Matrix: Filter

Analysis Batch: 182914

Client Sample ID: Lab Control Sample Prep Type: Total/NA

Prep Batch: 181586

			i otai						
Spike	LCS	LCS	Uncert.					%Rec.	
Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
25.5	25.59		2.59	1.00	0.0618	pCi/Samp	100	84 - 120	
26.0	27.21		2.73	1.00	0.114	pCi/Samp	104	82 - 122	
	25.5	25.5 Result 25.59	Added Result Qual 25.5 25.59	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) 25.5 25.59 2.59	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL 25.5 25.59 2.59 1.00	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL MDC 25.5 25.59 2.59 1.00 0.0618	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL MDC Unit 25.5 25.59 2.59 1.00 0.0618 pCi/Samp	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL MDC Unit %Rec 25.5 25.59 2.59 1.00 0.0618 pCi/Samp 100	Spike LCS LCS Uncert. %Rec. Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits 25.5 25.59 2.59 1.00 0.0618 pCi/Samp 100 84 - 120

LCS LCS %Yield Qualifier Tracer Limits 30 - 110 Uranium-232 83.3

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QC Sample Results

Client: Tetra Tech EM Inc.

Matrix: Filter

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCSD 160-181586/3-A

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

TestAmerica Job ID: 160-10908-2

Chefit Sample ID. Lab Control Sample Du
Prep Type: Total/NA
Prep Batch: 181580

Analysis Batc	h: 182915										Prep B	atch: 1	81586
						Total					_		
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Uranium-233/23		_	25.5	23.59		2.41	1.00	0.0599	pCi/Samp	93	84 - 120	0.40	1
4													
Uranium-238			26.0	24.68		2.50	1.00	0.0597	pCi/Samp	95	82 - 122	0.48	1
	LCSD	LCSD											
Tracer	%Yield	Qualifier	Limits										
I Iranium-232	87.7		30 110										

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10908-2

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Prep Batch: 181584

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10908-1	WAA-04-AF-PS-20150313	Total/NA	Filter	ExtChrom	
160-10908-2	WAA-00-AF-FB-20150313	Total/NA	Filter	ExtChrom	
LCS 160-181584/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-181584/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-181584/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 181586

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10908-1	WAA-04-AF-PS-20150313	Total/NA	Filter	ExtChrom	
160-10908-2	WAA-00-AF-FB-20150313	Total/NA	Filter	ExtChrom	
LCS 160-181586/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-181586/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-181586/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 181597

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10908-1	WAA-04-AF-PS-20150313	Total/NA	Filter	DPS-0	
160-10908-2	WAA-00-AF-FB-20150313	Total/NA	Filter	DPS-0	
LCS 160-181597/2-A	Lab Control Sample	Total/NA	Filter	DPS-0	
LCSD 160-181597/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0	
MB 160-181597/1-A	Method Blank	Total/NA	Filter	DPS-0	

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TestAmerica Job ID: 160-10908-2

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

Sample ID	Ba (40-110)		
<u> </u>	(40-110)		
04-AF-PS-20150313	97.9	· 	
00-AF-FB-20150313	97.9		
ontrol Sample	91.2		
ontrol Sample Dup	93.8		
od Blank	97.6		
	ontrol Sample ontrol Sample Dup	ontrol Sample 91.2 ontrol Sample Dup 93.8	ontrol Sample 91.2 ontrol Sample Dup 93.8

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

		Percent Yield (Acceptance Limits)		
		Th-229		
Lab Sample ID	Client Sample ID	(30-110)		
160-10908-1	WAA-04-AF-PS-20150313	88.8		
160-10908-2	WAA-00-AF-FB-20150313	86.1		
LCS 160-181584/2-A	Lab Control Sample	92.2		
LCSD 160-181584/3-A	Lab Control Sample Dup	94.5		
MB 160-181584/1-A	Method Blank	85.4		
Tracer/Carrier Legend				
Th-229 = Thorium-229				

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

		Percent Yield (Acceptance Limits)		
		U-232		
Lab Sample ID	Client Sample ID	(30-110)		
160-10908-1	WAA-04-AF-PS-20150313	89.9		
160-10908-2	WAA-00-AF-FB-20150313	92.0		
LCS 160-181586/2-A	Lab Control Sample	83.3		
LCSD 160-181586/3-A	Lab Control Sample Dup	87.7		
MB 160-181586/1-A	Method Blank	92.3		
Tracer/Carrier Legend				
U-232 = Uranium-232				

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Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 20, 2015
Sample Delivery Group (SDG):	J11120
Sample Numbers:	WAA-04-AF-PS-20150327 and WAA-00-AF-FB-20150327
Matrix / Number of Samples:	1 Air Sample and 1 Field Blank
documents entitled "Contract Labor Methods Data Review" (9240.1-48) Packages from Subcontracted Labor Agency Radiological Laboratory Acriteria specified in the applicable in The review was intended to identify apparent from the summary data pathat were found, and data qualificat limited to the available field and lab package.	y problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data
	alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Ell	كال كا 20 April 2015
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J11120 included one (1) environmental air (filter) sample and one (1) QC samples (a field blank). Samples were analyzed for gross alpha and beta radiation by EPA SW-846 Method 9310 and for cesium-137 and other gamma-emitters by Department of Energy (DOE) Method Ga-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. LCS and duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded no detectable activities and the field blank a low beta activity. The field sample yielded more than 5 times the field blank beta activity, so no qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

V. Surrogates

Surrogates are not used in these radioanalytical methods.

VI. Comments

Some detected activities were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with no significant qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-11120-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Elizabeth M. Aburcheur

Authorized for release by: 4/8/2015 3:10:33 PM Elizabeth Hoerchler, Project Mgmt. Assistant elizabeth.hoerchler@testamericainc.com

Designee for

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com



Review your project results through
Total Access

Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-11120-1

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11120-1

Job ID: 160-11120-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-11120-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 03/31/2015; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 18.3° C.

GROSS ALPHA AND GROSS BETA RADIOACTIVITY

Samples WAA-04-AF-PS-20150327 (160-11120-1) and WAA-00-AF-FB-20150327 (160-11120-2) were analyzed for Gross Alpha and Gross Beta Radioactivity in accordance with SW846 9310. The samples were prepared on 04/01/2015 and analyzed on 04/02/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 & OTHER GAMMA EMITTERS (GS)

Samples WAA-04-AF-PS-20150327 (160-11120-1) and WAA-00-AF-FB-20150327 (160-11120-2) were analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with GA-01-R. The samples were prepared and analyzed on 04/01/2015.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis 4/8/2015

TestAmerica St. Louis

Chain of Custody Record

Custody Record

TestAmerica

The LEADER IN ENVIRONMENTAL TESTING

13715 Rider Trail North

Earth City, MO 63045 Regulatory Program: DW phone 314.298.8566 fax NPDES ☐RCRA TestAmerica Laboratories, Inc. Other: COC No: **Client Contact** Project Manager: Dave Kinroth Site Contact: Dave Kinroth Date: 3-31-15 Tetra Tech. Inc. Tel/Fax: 314-517-6798 Lab Contact: Mike Franks Carrier: NA COCs 415 Oak Street **Analysis Turnaround Time** Sampler: Kansas City, MO 64106 CALENDAR DAYS ✓ WORKING DAYS For Lab Use Only: Walk-in Client: (816) 412-1786 Phone TAT if different from Below Radium-226 (GFPC) 9315 Total Alpha Radium (816) 816-410-1748 FAX 2 weeks Lab Sampling: 9310 Gross Alpha/Beta Project Name: West Lake Landfill Site 1 week Site: Bridgeton, MO Job / SDG No .: 2 days P O # 1105610 П 1 day A-01-R * 9315 F Type Sample Sample #of (C=Comp. Sample Identification Date Time G=Grab) Matrix Cont. Sample Specific Notes: 0 3/27/15 0:00 Filter Air Χ X X X 9315 Radium-226 (GFPC) contingent upon TAR results 0 1/0/00 0:00 X X Filter Air for all samples Х X 0 1/0/00 X 0:00 Filter Air 3/27/15 X X XX WAA-04-AF-PS-20150327 9:41 Filter Air 1/0/00 X X XX 0:00 Filter Air X XXX WAA-00-AF-FB-20150327 3/27/15 NA Filter Air Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Possible Hazard Identification: Sample Disposal (A fee may be assessed if samples are retained longer than 1 n Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. Archive for_ Skin Irritant Poison B Unknown Return to Client Disposal by Lab Months ✓ Non-Hazard ☐ Flammable Special Instructions/QC Requirements & Comments: Therm ID No .: Cooler Temp. (°C): Obs'd: Corr'd: Custody Seal No.: Custody Seals Intact: Yes ☐ No Received by Company; Date/Time: Date/Time: Relinquished by: Conlean Tetra Tech 3/36/15 13/6 Date/Time: Date/Time: Company: Received by: Company: Relinquished by: Relinquished by: Date/Time: Received in Laboratory by: Company: Date/Time: Company:

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Job Number: 160-11120-1

Login Number: 11120 List Source: TestAmerica St. Louis

List Number: 1 Creator: Clarke, Jill C

Client: Tetra Tech EM Inc.

oreator. Oldric, olir o		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Minimum Level (Dioxin)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Not Calculated

Quality Control

Relative error ratio

TestAmerica Job ID: 160-11120-1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

ML

NC

ND PQL

QC

RER RL

RPD

TEF

TEQ

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11120-1

Method	Method Description	Protocol	Laboratory
9310	Gross Alpha / Beta (GFPC)	SW846	TAL SL
GA-01-R	Cesium-137 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11120-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-11120-1	WAA-04-AF-PS-20150327	Filter	03/27/15 09:41	03/31/15 13:10
160-11120-2	WAA-00-AF-FB-20150327	Filter	03/27/15 00:00	03/31/15 13:10

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Client Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11120-1

Lab Sample ID: 160-11120-1

Matrix: Filter

Date Collected: 03/27/15 09:41

Client Sample ID: WAA-04-AF-PS-20150327

Date Received: 03/31/15 13:10

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.450	7	0.285	0.289	10.0	0.370	pCi/Sample	04/01/15 11:02	04/02/15 06:53	1
Gross Beta	11.3		0.940	1.47	10.0	0.366	pCi/Sample	04/01/15 11:02	04/02/15 06:53	1
Method: GA-01-R -	Cesium-137 8	Other Gan	nma Emitters	(GS)						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	1.44	BI	5.06	5.06	(20.0)	9.21	pCi/Sample	04/01/15 11:04	04/01/15 18:44	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(2σ+/-)	(2\sigma+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	04/01/15 11:04	04/01/15 18:44	1

Client Sample ID: WAA-00-AF-FB-20150327

Result Qualifier

None

 $(2\sigma + /-)$

Date Collected: 03/27/15 00:00

Date Received: 03/31/15 13:10

Radionuclides

Other Detected Radionuclide Lab Sample ID: 160-11120-2

Analyzed

04/01/15 18:45

Dil Fac

Matrix: Filter

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.0465	W	0.170	0.170	10.0	0.337	pCi/Sample	04/01/15 11:02	04/02/15 06:53	1
Gross Beta	1.40	7	0.378	0.403	10.0	0.371	pCi/Sample	04/01/15 11:02	04/02/15 06:53	1
Method: GA-01-R	- Cesium-137 8	& Other Gan								
Method: GA-01-R	- Cesium-137 &	& Other Gan	nma Emitters Count Uncert.	G (GS) Total Uncert.						
		& Other Gan	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Analyte		Qualifier	Count Uncert.	Total Uncert.	RL 20.0	MDC 11.8		Prepared 04/01/15 11.04	Analyzed 04/01/15 18:45	Dil Fac
Method: GA-01-R Analyte Cesium-137	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)						Dil Fac

 $(2\sigma + /-)$

HUE 20 April 2015

RL

MDC Unit

pCi/Sample

Prepared

04/01/15 11 04

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11120-1

Method: 9310 - Gross Alpha / Beta (GFPC)

Lab Sample ID: MB 160-182696/1-A

Matrix: Filter

Analysis Batch: 182997

Client Sample ID: Method Blank

Prep Type: Total/NA **Prep Batch: 182696**

			Count	i otai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.04917	U	0.204	0.204	10.0	0.396	pCi/Sample	04/01/15 11:02	04/02/15 06:53	1
Gross Beta	0.1170	U	0.206	0.206	10.0	0.358	pCi/Sample	04/01/15 11:02	04/02/15 06:53	1

Lab Sample ID: LCS 160-182696/2-A

Matrix: Filter

Analysis Batch: 182997

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 182696

				Total						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Gross Alpha	5.36	5.226		0.985	10.0	0.372	pCi/Samp	97	75 - 125	

Lab Sample ID: LCSB 160-182696/3-A

Matrix: Filter

Analysis Batch: 182997

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 182696

				Total						
	Spike	LCSB	LCSB	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Gross Beta	17.8	17.78		2.13	10.0	0.388	pCi/Samp	100	75 - 125	

Lab Sample ID: 160-11120-1 DU

Matrix: Filter

Analysis Batch: 183055

Client Sample ID: WAA-04-AF-PS-20150327

04/01/15 11:04

pCi/Sample

Prep Type: Total/NA

Prep Batch: 182696

					Total						
	Sample	Sample	DU	DU	Uncert.						RER
Analyte	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit		RER	Limit
Gross Alpha	0.450		0.7639		0.369	10.0	0.414	pCi/Samp		0.48	1
Gross Beta	11.3		11.82		1.53	10.0	0.406	pCi/Samp		0.19	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

None

Lab Sample ID: MB 160-182697/1-A Client Sample ID: Method Blank Matrix: Filter

Analysis Batch: 182671

Analysis Dutch. 102011									i icp batcii.	102037
			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-0.4414	U	4.35	4.35	20.0	8.09	pCi/Sample	04/01/15 11:04	04/01/15 18:44	1
			Count	Total						
Other Detected	MB	MB	Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac

Other Detected Radionuclide

TestAmerica St. Louis

Prep Type: Total/NA Pren Batch: 182697

04/01/15 18:44

QC Sample Results

Client: Tetra Tech EM Inc.

Matrix: Filter

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCS 160-182697/2-A

TestAmerica Job ID: 160-11120-1

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

Analysis Batch: 182674									Prep Batch	1: 1826
				Total						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Americium-241	32000	30710		3200		131	pCi/Samp	96	87 - 116	
Cesium-137	11100	10940		1150	20.0	69.8	pCi/Samp	99	87 - 120	
Cobalt-60	11500	11400		1150		50.0	pCi/Samp	99	87 ₋ 115	

Lab Sample ID: 160-11120-1 DU Client Sample ID: WAA-04-AF-PS-20150327

Matrix: Filter Prep Type: Total/NA Analysis Batch: 182670 **Prep Batch: 182697**

Total Sample Sample DU DU Uncert. RER Analyte Result Qual Result Qual (2σ+/-) RL MDC Unit RER Limit Cesium-137 1.44 U -2.130 U 20.0 10.0 pCi/Samp 0.33 5.73 Total Other Detected DU DU Sample Sample Uncert. RER (2σ+/-) Radionuclides Result Qual Result Qual RL MDC Unit RER Limit pCi/Samp Other Detected None None Radionuclide

4/8/2015

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11120-1

Rad

Prep Batch: 182696

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-11120-1	WAA-04-AF-PS-20150327	Total/NA	Filter	None	
160-11120-1 DU	WAA-04-AF-PS-20150327	Total/NA	Filter	None	
160-11120-2	WAA-00-AF-FB-20150327	Total/NA	Filter	None	
LCS 160-182696/2-A	Lab Control Sample	Total/NA	Filter	None	
LCSB 160-182696/3-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-182696/1-A	Method Blank	Total/NA	Filter	None	

Prep Batch: 182697

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-11120-1	WAA-04-AF-PS-20150327	Total/NA	Filter	None	
160-11120-1 DU	WAA-04-AF-PS-20150327	Total/NA	Filter	None	
160-11120-2	WAA-00-AF-FB-20150327	Total/NA	Filter	None	
LCS 160-182697/2-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-182697/1-A	Method Blank	Total/NA	Filter	None	

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Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 20, 2015
Sample Delivery Group (SDG):	J11233
Sample Numbers:	WAA-04-AF-PS-20150403 and WAA-00-AF-FB-20150403
Matrix / Number of Samples:	1 Air Sample and 1 Field Blank
documents entitled "Contract Labor Methods Data Review" (9240.1-48) Packages from Subcontracted Labor Agency Radiological Laboratory Arcriteria specified in the applicable method to identify apparent from the summary data pacthat were found, and data qualificati limited to the available field and lab package. I, Harry Ellis, certify that all data variations are method to identify apparent from the summary data package.	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data didation criteria outlined in the above-referenced documents were deet to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J11233 included one (1) environmental air (filter) sample and one (1) QC samples (a field blank). Samples were analyzed for gross alpha and beta radiation by EPA SW-846 Method 9310 and for cesium-137 and other gamma-emitters by Department of Energy (DOE) Method Ga-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. LCS and duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded no detectable activities and the field blank a low beta activity. The field sample yielded about 5 times the field blank beta activity, so no qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

V. Surrogates

Surrogates are not used in these radioanalytical methods.

VI. Comments

Some detected activities were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with no significant qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-11233-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Elizabeth M. Aburcheur

Authorized for release by: 4/14/2015 3:56:03 PM Elizabeth Hoerchler, Project Mgmt. Assistant elizabeth.hoerchler@testamericainc.com

Designee for Erika Gish, Project Manager II (314)298-8566

erika.gish@testamericainc.com

.....LINKS

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Total Access

Have a Question?



Visit us at:

www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-11233-1

Table of Contents

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11233-1

Job ID: 160-11233-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-11233-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 04/07/2015; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 18.0° C.

GROSS ALPHA AND GROSS BETA RADIOACTIVITY

Samples WAA-04-AF-PS-20150403 (160-11233-1) and WAA-00-AF-FB-20150403 (160-11233-2) were analyzed for Gross Alpha and Gross Beta Radioactivity in accordance with SW846 9310. The samples were prepared on 04/10/2015 and analyzed on 04/12/2015.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 & OTHER GAMMA EMITTERS (GS)

Samples WAA-04-AF-PS-20150403 (160-11233-1) and WAA-00-AF-FB-20150403 (160-11233-2) were analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with GA-01-R. The samples were prepared on 04/10/2015 and analyzed on 04/11/2015.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

Chain of Custody Record

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

13715 Rider Trail North

Earth City, MO 63045 phone 314.298.8566 fax	Regul	atory Pro	gram:	low [INPDES	ſ	RCR	A	_o	ther:											TestAmerica	Laboratories, Inc.
Client Contact	Project Manager: Dave Kinroth					. – – – – – – – – – – – – – – – – – – –							Date: 4-7-15				COC No:					
Tetra Tech, Inc.		314-517-67				Lab Contact: Mike Franks Ca						Carrier: NA							1 of	1 COCs		
415 Oak Street	- 1	Analysis Tu	rnaround	Time		П	T			T	T	T	T		T		T			T	Sampler:	
Kansas City, MO 64106	CALENE	AR DAYS	₩ WORK	ING DAYS	5						-					and the second					For Lab Use On	ly:
(816) 412-1786 Phone	TAT	if different from	n Below	20	_						0	5									Walk-in Client:	
(816) 816-410-1748 FAX		21	weeks			2	- 10		in	Ę !	티		1 1								Lab Sampling:	
Project Name: West Lake Landfill Site		1	week			Sample (Y/N)	Bet	Spec	रेबव	sotopic Thorium	and a				1	distance						L
Site: Bridgeton, MO		2	iays			9	ha	SH	ha	户	5 3	1									Job / SDG No.:	
PO# 1105610		1	day			E .	Y	am	Ap	ido					1					-		
			Sample			Sc	Gross Alpha/Beta	GA-01-R Gamm	9315 Total Alpha Radium	So	A-U1-K isotopic Uranium * 9315 Radium-226 (GFPC)											
	Sample	Sample	Type (C=Comp.		# of	Filtered	0 0	5	51	1-R	는 <u> </u>	2										
Sample Identification	Date	Time	G=Grab)	Matrix	Cont	Ē,	9310	GA	931	A-01-R	A 80	3			agramation.						Sample S	Specific Notes:
0	4/3/15	0:00	Filter	Air	1	П	Х	Х	Х	X .	хх										* 9315 Radium-2	226 (GFPC)
0	1/0/00	0:00	Filter	Air	1		x	Х	Х	X.	x x										contingent upon	TAR results
0	1/0/00	0:00	Filter	Air	1	П	Х	Х	Х	X.	хх										for all samples	
WAA-04-AF-PS-20150403	4/3/15	9:20	Filter	Air	1		Х	x	Х	x	х×											
0	1/0/00	0:00	Filter	Air	1		Х	Х	Х	X	x x											====
WAA-00-AF-FB-20150403	4/3/15	NA	Filter	Air	1		х	x	x	X	x x											80 -11
2						П									-							233
3						П																Chai
																						n of C
		week order and a service o				П																Custo
																	and the same of th					9
Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5=	NaOH; 6=	Other																				
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please I Comments Section if the lab is to dispose of the sample.	ist any EP	A Waste C	odes for the	sample	e in the		Sam	ole E	Dispo	osal	(Afe	ee m	ay be	e ass	esse	d if	sam	ples	are i	etain	ed longer than	
☑Non-Hazard ☐Flammable ☐Skin Irritant	Poison	В	Unkno	wn				Retur	n to C	Client			Dis	sposal	by Lat	j			Archive	for	Months	
Special Instructions/QC Requirements & Comments:				***************************************											As-							
Custody Seals Intact: ☐ Yes ☐ No	Custody 8	Seal No.:				- /			Co	oler 7	Temp	o. (°C): Ob:	s'd:_			Corr	d:	T		Therm ID No.:	
Relinquished by: Ture balow	Company	: -	h	Date/T	ime:	320	Rece	yed	bv:	r le		1.			C	omp	any:	77			Date/Time:	1320
Relinquished by:	Company		•	Date/T			Rece	ived		<u></u>	ear						pany:				Date/Time:	
Relinquished by:	Company			Date/T	ime:		Rece	ived	in L	abora	atory	by:			C	omp	any:				Date/Time:	

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Job Number: 160-11233-1

Login Number: 11233

List Source: TestAmerica St. Louis

List Number: 1 Creator: Clarke, Jill C

Client: Tetra Tech EM Inc.

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11233-1

Qualifiers

Rad

MDL

ML

NC

ND PQL

QC

RL

RER

RPD

TEF

TEQ

Qualifier	Qualifier Description
-----------	-----------------------

Method Detection Limit

Minimum Level (Dioxin)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Not Calculated

Quality Control

Relative error ratio

Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11233-1

Method	Method Description	Protocol	Laboratory
9310	Gross Alpha / Beta (GFPC)	SW846	TAL SL
GA-01-R	Cesium-137 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11233-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-11233-1	WAA-04-AF-PS-20150403	Filter	04/03/15 09:20	04/07/15 13:20
160-11233-2	WAA-00-AF-FB-20150403	Filter	04/03/15 00:00	04/07/15 13:20

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Client Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11233-1

Client Sample ID: WAA-04-AF-PS-20150403 Lab Sample ID: 160-11233-1 Date Collected: 04/03/15 09:20 Matrix: Filter Date Received: 04/07/15 13:20 Method: 9310 - Gross Alpha / Beta (GFPC) Count Total Uncert. Uncert. Analyte Result Qualifier (20+/-) (20+/-) RL MDC Prepared Analyzed Dil Fac Unit 0.294 0.300 10.0 pCi/Sample 04/10/15 10:25 04/12/15 20:32 Gross Alpha 0.520 0.356 0.916 10.0 **Gross Beta** 10.6 1.40 0.370 pCi/Sample 04/10/15 10:25 04/12/15 20:32 Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) Count Total Uncert. Uncert. Result Qualifier $(2\sigma + /-)$ (20+/-) RL MDC Unit Prepared Analyzed Dil Fac Analyte 04/11/15 09:03 pCi/Sample 04/10/15 10:34 Cesium-137 1.85 4.84 4.84 20.0 8.68 Count Total Other Detected Uncert. Uncert. Radionuclides Result Qualifier (20+/-) (20+/-) RL MDC Unit Prepared Analyzed Dil Fac None 04/10/15 10:34 04/11/15 09:03 Other Detected pCi/Sample Radionuclide Client Sample ID: WAA-00-AF-FB-20150403 Lab Sample ID: 160-11233-2 Date Collected: 04/03/15 00:00 Matrix: Filter Date Received: 04/07/15 13:20 Method: 9310 - Gross Alpha / Beta (GFPC) Count Total Uncert. Uncert. Analyte Result Qualifier $(2\sigma + / -)$ $(2\sigma + / -)$ RL MDC Unit Prepared Analyzed Dil Fac Gross Alpha 0.0190 0.191 0.191 10.0 0.388 pCi/Sample 04/10/15 10:25 04/12/15 20:32 0.468 0.516 10.0 pCi/Sample 04/10/15 10:25 04/12/15 20:32 0.438 **Gross Beta** Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) Count Total Uncert. Uncert. Result Qualifier $(2\sigma + 1-)$ $(2\sigma + 1-)$ RL MDC Unit Prepared Analyzed Dil Fac Analyte 6.06 6.06 20.0 11.4 pCi/Sample 04/10/15 10:34 04/11/15 09:05 Cesium-137 0.650 Count Total Other Detected Uncert. Uncert. Dil Fac Radionuclides Result Qualifier $(2\sigma + /-)$ $(2\sigma + /-)$ RL MDC Unit Prepared Analyzed 04/10/15 10:34 04/11/15 09 05 pCi/Sample Other Detected None Radionuclide 20 April 2017

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Method: 9310 - Gross Alpha / Beta (GFPC)

Lab Sample ID: MB 160-184913/1-A

Matrix: Filter

Analysis Batch: 185078

Client	Sample	ID:	Method	Blank
	Dre	on T	vno: To	tal/NLA

Prep Type: Total/NA **Prep Batch: 184913**

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.07115	U	0.184	0.184	10.0	0.349	pCi/Sample	04/10/15 10:25	04/12/15 20:32	1
Gross Beta	0.1760	U	0.220	0.220	10.0	0.364	pCi/Sample	04/10/15 10:25	04/12/15 20:32	1

Lab Sample ID: LCS 160-184913/2-A

Matrix: Filter

Analysis Batch: 185078

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 184913

Total LCS LCS %Rec. Spike Uncert. Analyte Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits Gross Alpha 5.36 5.751 1.07 10.0 0.409 pCi/Samp 107 75 - 125

Lab Sample ID: LCSB 160-184913/3-A

Matrix: Filter

Analysis Batch: 185078

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 184913

				Total							
	Spike	LCSB	LCSB	Uncert.					%Rec.		
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits		
Gross Beta	17.8	18.66		2.22	10.0	0.405	pCi/Samp	105	75 - 125		

Lab Sample ID: 160-11233-1 DU

Matrix: Filter

Analysis Batch: 185078

Client Sample ID: WAA-04-AF-PS-20150403

Prep Type: Total/NA

Prep Batch: 184913

					Total					
	Sample	Sample	DU	DU	Uncert.					RER
Analyte	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit	RER	Limit
Gross Alpha	0.520		0.2988	U	0.247	10.0	0.349	pCi/Samp	0.40	1
Gross Beta	10.6		10.77		1.42	10.0	0.364	pCi/Samp	0.07	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

None

Lab Sample ID: MB 160-184916/1-A Client Sample ID: Method Blank Matrix: Filter Prep Type: Total/NA

Analysis Batch: 185038									Prep Batch:	184916
			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-1.242	U	5.34	5.35	20.0	9.56	pCi/Sample	04/10/15 10:34	04/11/15 09:03	1
			Count	Total						
Other Detected	MB	MB	Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac

pCi/Sample

04/10/15 10:34

Other Detected Radionuclide

TestAmerica St. Louis

04/11/15 09:03

QC Sample Results

Client: Tetra Tech EM Inc.

Matrix: Filter

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCS 160-184916/2-A

TestAmerica Job ID: 160-11233-1

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 184916

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

								Prep Batch: 18491
			Total					
Spike	LCS	LCS	Uncert.					%Rec.
Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits
32000	31450		3270		115	pCi/Samp	98	87 _ 116
11100	10910		1150	20.0	63.8	pCi/Samp	99	87 ₋ 120
11400	11160		1130		52.6	pCi/Samp	98	87 ₋ 115
	Added 32000 11100	Added Result 32000 31450 11100 10910	Added Result Qual 32000 31450 11100 10910	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) 32000 31450 3270 11100 10910 1150	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL 32000 31450 3270 11100 10910 1150 20.0	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL MDC 32000 31450 3270 115 11100 10910 1150 20.0 63.8	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL MDC Unit 32000 31450 3270 115 pCi/Samp 11100 10910 1150 20.0 63.8 pCi/Samp	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL MDC Unit %Rec 32000 31450 3270 115 pCi/Samr 98 11100 10910 1150 20.0 63.8 pCi/Samr 99

Lab Sample ID: 160-11233-1 DU Client Sample ID: WAA-04-AF-PS-20150403

Matrix: Filter Prep Type: Total/NA Analysis Batch: 185037 **Prep Batch: 184916**

Total Sample Sample DU DU Uncert. RER Analyte Result Qual Result Qual (2σ+/-) RL MDC Unit RER Limit Cesium-137 1.85 U 0.2520 U 20.0 10.7 pCi/Samp 0.15 5.84 Total Other Detected DU DU Sample Sample Uncert. RER (2σ+/-) Radionuclides Result Qual Result Qual RL MDC Unit RER Limit pCi/Samp Other Detected None None Radionuclide

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-11233-1

Rad

Prep Batch: 184913

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-11233-1	WAA-04-AF-PS-20150403	Total/NA	Filter	None	
160-11233-1 DU	WAA-04-AF-PS-20150403	Total/NA	Filter	None	
160-11233-2	WAA-00-AF-FB-20150403	Total/NA	Filter	None	
LCS 160-184913/2-A	Lab Control Sample	Total/NA	Filter	None	
LCSB 160-184913/3-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-184913/1-A	Method Blank	Total/NA	Filter	None	

Prep Batch: 184916

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-11233-1	WAA-04-AF-PS-20150403	Total/NA	Filter	None	<u> </u>
160-11233-1 DU	WAA-04-AF-PS-20150403	Total/NA	Filter	None	
160-11233-2	WAA-00-AF-FB-20150403	Total/NA	Filter	None	
LCS 160-184916/2-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-184916/1-A	Method Blank	Total/NA	Filter	None	

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Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:

West Lake Landfill Site, Bridgeton, Missouri

Laboratory:	Pace Analytical Services, Inc. (Lenexa, Kansas)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 16, 2015
Sample Delivery Group (SDG):	60188508
Sample Numbers:	WAA-01-RV-PS-20150220, WAA-02-RV-PS-20150220, WAA-03-RV-PS-20150220, WAA-04-RV-PS-20150220, WAA-04-RV-DU-20150220, WAA-05-RV-PS-20150220, and WAA-00-RV-TB-20150220
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank
documents entitled "Contract Labor Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data parthat were found, and data qualifications.	o the U.S. Environmental Protection Agency (EPA) Region 7 ratory Program National Functional Guidelines for Superfund Organic 1, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified or problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data
	alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Elli	16 April 2015
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) 60188508 included five (5) environmental air (adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for selected volatile organic compounds via EPA Air Method TO-17. The following summarizes the data validation that was performed.

VOLATILE ORGANIC COMPOUND ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) blank. The field blank yielded concentrations of four aromatic hydrocarbons, suggesting contamination from kerosene or a similar mixture that occurred during sample processing or analysis. The similar concentrations of these analytes in the four field samples analyzed with the field blank were qualified as artifacts and flagged "U".

IV. Laboratory Control Sample (LCS)

All results from one LCS pair were within QC limits. However, most analytes in the duplicate LCS analyzed with samples WAA-03-RV-PS-20150220 and WAA-04-RV-DU-20150220 yielded recoveries below the laboratory's QC limits. The laboratory ascribed these irregularities to a lack of sensitivity associated with low responses to the continuing calibration standard. Due to the pervasiveness of these irregularities, all results for samples WAA-03-RV-PS-20150220 and WAA-04-RV-DU-20150220 were qualified as estimated, possibly biased low, and flagged "J" or "UJ", as appropriate.

V. Surrogates

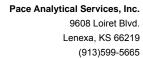
All surrogate recoveries were within QC limits. No qualifications were applied.

VI. Comments

After application of the qualifications discussed above, trichloroethene was reported in one sample and toluene in two others. There are significant differences in the field duplicate pair, apparently a consequence of the fact that they were analyzed in separate batches. Each resembles the samples it was analyzed with more than it resembles the other member of the pair.

VII. Overall Assessment of Data

The results from these analyses, even after application of qualifications, are very different from those of preceding sampling events. Unless these sorts of results are confirmed by subsequent sampling events, they should be rejected.





March 19, 2015

Emily Fisher TETRA TECH EMI 415 Oak Kansas City, MO 64106

RE: Project: WEST LAKE LANDFILL Pace Project No.: 60188508

Dear Emily Fisher:

Enclosed are the analytical results for sample(s) received by the laboratory on February 24, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Shuri Dosenstande

Sherri Rosenstangle sherri.rosenstangle@pacelabs.com Project Manager

Enclosures



9608 Loiret Blvd. Lenexa, KS 66219 (913)599-5665



CERTIFICATIONS

Project: WEST LAKE LANDFILL

Pace Project No.: 60188508

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414

A2LA Certification #: 2926.01 Alaska Certification #: UST-078 Alaska Certification #MN00064 Alabama Certification #40770 Arizona Certification #: AZ-0014 Arkansas Certification #: 88-0680 California Certification #: 01155CA Colorado Certification #Pace Connecticut Certification #: PH-0256

EPA Region 8 Certification #: 8TMS-L Florida/NELAP Certification #: E87605

Guam Certification #:14-008r Georgia Certification #: 959 Georgia EPD #: Pace

Idaho Certification #: MN00064 Hawaii Certification #MN00064 Illinois Certification #: 200011 Indiana Certification#C-MN-01 Iowa Certification #: 368

Kansas Certification #: E-10167 Kentucky Dept of Envi. Protection - DW #90062 Kentucky Dept of Envi. Protection - WW #:90062

Louisiana DEQ Certification #: 3086 Louisiana DHH #: LA140001 Maine Certification #: 2013011 Maryland Certification #: 322 Michigan DEPH Certification #: 9909 Mississippi Certification #: Pace Montana Certification #: MT0092 Nevada Certification #: MN_00064

Nebraska Certification #: Pace New Jersey Certification #: MN-002 New York Certification #: 11647 North Carolina Certification #: 530

Minnesota Certification #: 027-053-137

North Carolina State Public Health #: 27700

North Dakota Certification #: R-036

Ohio EPA #: 4150 Ohio VAP Certification #: CL101 Oklahoma Certification #: 9507 Oregon Certification #: MN200001 Oregon Certification #: MN300001 Pennsylvania Certification #: 68-00563

Puerto Rico Certification Saipan (CNMI) #:MP0003 South Carolina #:74003001 Texas Certification #: T104704192 Tennessee Certification #: 02818 Utah Certification #: MN000642013-4 Virginia DGS Certification #: 251 Virginia/VELAP Certification #: Pace Washington Certification #: C486 West Virginia Certification #: 382 West Virginia DHHR #:9952C

Wisconsin Certification #: 999407970

REPORT OF LABORATORY ANALYSIS



SAMPLE SUMMARY

Project: WEST LAKE LANDFILL

Pace Project No.: 60188508

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60188508001	WAA-01-RV-PS-20150220	Air	02/20/15 13:00	02/24/15 09:40
60188508002	WAA-02-RV-PS-20150220	Air	02/20/15 12:07	02/24/15 09:40
60188508003	WAA-03-RV-PS-20150220	Air	02/20/15 12:32	02/24/15 09:40
60188508004	WAA-04-RV-PS-20150220	Air	02/20/15 12:50	02/24/15 09:40
60188508005	WAA-05-RV-PS-20150220	Air	02/20/15 12:20	02/24/15 09:40
60188508006	WAA-04-RV-DU-20150220	Air	02/20/15 12:50	02/24/15 09:40
60188508007	WAA-00-RV-TB-20150220	Air	02/20/15 13:10	02/24/15 09:40

REPORT OF LABORATORY ANALYSIS

(913)599-5665



SAMPLE ANALYTE COUNT

Project: WEST LAKE LANDFILL

Pace Project No.: 60188508

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60188508001	WAA-01-RV-PS-20150220	TO-17M	RTP	13	PASI-M
60188508002	WAA-02-RV-PS-20150220	TO-17M	RTP	13	PASI-M
60188508003	WAA-03-RV-PS-20150220	TO-17M	RTP	15	PASI-M
60188508004	WAA-04-RV-PS-20150220	TO-17M	RTP	13	PASI-M
60188508005	WAA-05-RV-PS-20150220	TO-17M	RTP	13	PASI-M
60188508006	WAA-04-RV-DU-20150220	TO-17M	RTP	15	PASI-M
60188508007	WAA-00-RV-TB-20150220	TO-17M	RTP	13	PASI-M

REPORT OF LABORATORY ANALYSIS



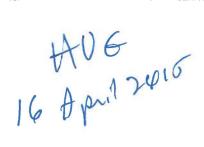
ANALYTICAL RESULTS

Project:

WEST LAKE LANDFILL

Pace Project No.:

Sample: WAA-01-RV-PS-20150220	Lab ID: 6018	8508001	Collected: 02/20/1	5 13:00	Received: 02	/24/15 09:40 N	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Metho	od: TO-17N	Preparation Metho	d: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 15:44	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 15:44	156-60-5	
Ethylbenzene	0.21 🗸	ug/m3	0.096	1	02/27/15 08:34	02/27/15 15:44	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 15:44	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 15:44	1634-04-4	
Tetrachloroethene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 15:44	127-18-4	
Trichloroethene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 15:44	79-01-6	
1,2,4-Trimethylbenzene	0.32 💆	ug/m3	0.24	1	02/27/15 08:34	02/27/15 15:44	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 15.44	108-67-8	
Vinyl chloride	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 15:44	75-01-4	
m&p-Xylene	0.57	ug/m3	0.19	1	02/27/15 08:34	02/27/15 15:44	179601-23-1	
o-Xylene Surrogates	0.22 4	ug/m3	0.096	1	02/27/15 08:34	02/27/15 15:44	95-47-6	
Chlorobenzene-d5 (S)	100	%.		1	02/27/15 08:34	02/27/15 15:44	3114-55-4	





ANALYTICAL RESULTS

Project:

WEST LAKE LANDFILL

Pace Project No.:

60188508

Sample: WAA-02-RV-PS-20150220	Lab ID: 60188	3508002	Collected: 02/20/1	5 12:07	Received: 02	2/24/15 09:40 N	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Metho	d: TO-17N	Preparation Metho	d: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:16	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:16	156-60-5	
Ethylbenzene	0.18 🔾	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:16	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 16:16	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:16	1634-04-4	
Tetrachloroethene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 16:16	127-18-4	
Trichloroethene	0.41	ug/m3	0.24	1	02/27/15 08:34	02/27/15 16:16	79-01-6	
1.2,4-Trimethylbenzene	0.28	ug/m3	0.24	1	02/27/15 08:34	02/27/15 16:16	95-63-6	
,3,5-Trimethylbenzene	ND \	ug/m3	0.24	1	02/27/15 08:34	02/27/15 16:16	108-67-8	
Vinyl chloride	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:16	75-01-4	
m&p-Xylene	0.46 🗸	ug/m3	0.19	1	02/27/15 08:34	02/27/15 16:16	179601-23-1	
o-Xylene Surrogates	0.18 🗸	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:16	95-47-6	
Chlorobenzene-d5 (S)	111	%.		1	02/27/15 08:34	02/27/15 16:16	3114-55-4	

16 AM 15



ANALYTICAL RESULTS

Project:

WEST LAKE LANDFILL

Pace Project No.:

60188508

Sample: WAA-03-RV-PS-20150220	Lab ID: 60188508003	Collected: 02/20/15 12:32	Received:	02/24/15 09:40	Matrix. Air						
Comments: • Sample was extracted three days outside the recommended extraction period for TO17 Passive.											

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Method	: TO-17M	Preparation Metho	d: TO-	17M			
Benzene	ND U	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	71-43-2	CL
cis-1,2-Dichloroethene		ug/m3	0.19	1	03/16/15 09:15	03/18/15 10:40	156-59-2	CL,L2
trans-1,2-Dichloroethene	ND	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	156-60-5	CL,L2
Ethylbenzene	ND	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	100-41-4	L2
Isopropylbenzene (Cumene)	ND	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	98-82-8	
Methyl-tert-butyl ether	ND 🌜	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	1634-04-4	CL,L2
Tetrachloroethene	ND W	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	127-18-4	
Toluene —	0.24	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	108-88-3	CL,L2
Trichloroethene	NDUJ	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	79-01-6	CL,L2
1,2,4-Trimethylbenzene	ND	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	108-67-8	
Vinyl chloride	ND	ug/m3	0.62	1	03/16/15 09:15	03/18/15 10:40	75-01-4	CL,L2
m&p-Xylene	ND 🕹	ug/m3	0.19	1	03/16/15 09:15	03/18/15 10:40	179601-23-1	L2
o-Xylene	ND U	ug/m3	0.096	1	03/16/15 09:15	03/18/15 10:40	95-47-6	L2
Surrogates								
a,a,a-Trifluorotoluene (S)	49	%.	38-150	1	03/16/15 09:15	03/18/15 10:40	98-08-8	

14UE 16 Apr 15

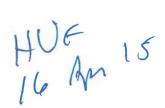


Project:

WEST LAKE LANDFILL

Pace Project No.:

Sample: WAA-04-RV-PS-20150220	Lab ID: 6018	B508004	Collected: 02/20/1	15 12:50	Received: 02	/24/15 09:40 N	fatrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
O17M VOC MS AIR Passive	Analytical Metho	od: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:48	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:48	156-60-5	
Ethylbenzene	0.19 🔾	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:48	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 16:48	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:48	1634-04-4	
etrachloroethene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 16:48	127-18-4	
richloroethene	ND _	ug/m3	0.24	1	02/27/15 08:34	02/27/15 16:48	79-01-6	
,2,4-Trimethylbenzene	0.31 🗸	ug/m3	0.24	1	02/27/15 08:34	02/27/15 16:48	95-63-6	
,3,5-Trimethylbenzene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 16:48	108-67-8	
/inyl chloride	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:48	75-01-4	
n&p-Xylene	0.53 🗸	ug/m3	0.19	1	02/27/15 08:34	02/27/15 16:48	179601-23-1	
p-Xylene	0.20 🗸	ug/m3	0.096	1	02/27/15 08:34	02/27/15 16:48	95-47-6	
Surrogates								
Chlorobenzene-d5 (S)	111	%.		1	02/27/15 08:34	02/27/15 16:48	3114-55-4	





Project:

WEST LAKE LANDFILL

Pace Project No.:

60188508

Sample: WAA-05-RV-PS-20150220	Lab ID: 6018	8508005	Collected: 02/20/1	5 12:20	Received: 02	/24/15 09:40 N	latrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qua
TO17M VOC MS AIR Passive	Analytical Metho	od: TO-17N	Preparation Metho	d: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 17:20	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 17:20	156-60-5	
thylbenzene	0.19 🗸	ug/m3	0.096	1	02/27/15 08:34	02/27/15 17:20	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 17:20	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 17:20	1634-04-4	
etrachloroethene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 17:20	127-18-4	
richloroethene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 17:20	79-01-6	
,2,4-Trimethylbenzene	0.26	ug/m3	0.24	1	02/27/15 08:34	02/27/15 17:20	95-63-6	
,3,5-Trimethylbenzene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 17:20	108-67-8	
/inyl chloride	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 17:20	75-01-4	
n&p-Xylene	0.52 🗸	ug/m3	0.19	1	02/27/15 08:34	02/27/15 17:20	179601-23-1	
o-Xylene Surrogates	0.20 💆	ug/m3	0.096	1	02/27/15 08:34	02/27/15 17:20	95-47-6	
Chlorobenzene-d5 (S)	116	%.		1	02/27/15 08:34	02/27/15 17:20	3114-55-4	

14UE 16 Am LT



Project:

WEST LAKE LANDFILL

Pace Project No.:

60188508

Sample: WAA-04-RV-DU-20150220	Lab ID: 60188508006	Collected: 02/20/15 12:50	Received:	02/24/15 09:40	Matrix: Air
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Comments:	 Sample was extracted three 	days outside the recommended	d extraction period for TO17 Passive.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meth	od: TO-17M	Preparation Metho	d: TO-	17M			
Benzene	ND 🕔	y ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	71-43-2	CL
cis-1,2-Dichloroethene	ND	ug/m3	0.19	1	03/16/15 09:15	03/18/15 11:05	156-59-2	CL,L2
trans-1,2-Dichloroethene	ND	ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	156-60-5	CL,L2
Ethylbenzene	ND	ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	100-41-4	L2
Isopropylbenzene (Cumene)	ND	ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	98-82-8	
Methyl-tert-butyl ether	ND 👃	ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	1634-04-4	CL,L2
Tetrachloroethene	ND 🔽	≥ ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	127-18-4	
Toluene	0.20	ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	108-88-3	CL,L2
Trichloroethene	ND V	1 ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	79-01-6	CL,L2
1,2,4-Trimethylbenzene	ND	ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	108-67-8	
Vinyl chloride	ND	ug/m3	0.62	1	03/16/15 09:15	03/18/15 11:05	75-01-4	CL,L2
m&p-Xylene	ND V	ug/m3	0.19	1	03/16/15 09:15	03/18/15 11:05	179601-23-1	L2
o-Xylene	ND 🖊	フ ug/m3	0.096	1	03/16/15 09:15	03/18/15 11:05	95-47-6	L2
Surrogates								
a,a,a-Trifluorotoluene (S)	46	%.	38-150	1	03/16/15 09:15	03/18/15 11:05	98-08-8	

HU6 16 Apr 15



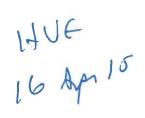
Project:

WEST LAKE LANDFILL

Pace Project No.:

Date: 03/19/2015 04:40 PM

Sample: WAA-00-RV-TB-20150220	Lab ID: 601	88508007	Collected: 02/20/1	5 13:10	Received: 02	/24/15 09:40	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meth	nod: TO-17N	A Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 14:24	156-59-2	
trans-1.2-Dichloroethene	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 14:24	156-60-5	
Ethylbenzene —	0.14	ug/m3	0.096	1	02/27/15 08:34	02/27/15 14:24	100-41-4	
isopropyibenzene (Cumene)	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 14:24	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 14:24	1634-04-4	
Tetrachloroethene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 14:24	127-18-4	
Trichloroethene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 14:24	79-01-6	
1,2,4-Trimethylbenzene —	0.34	ug/m3	0.24	1	02/27/15 08:34	02/27/15 14:24	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	0.24	1	02/27/15 08:34	02/27/15 14:24	108-67-8	
Vinyl chloride	ND	ug/m3	0.096	1	02/27/15 08:34	02/27/15 14:24	75-01-4	
m&p-Xylene —	0.39	ug/m3	0.19	1	02/27/15 08:34	02/27/15 14:24	179601-23-1	
o-Xylene —	0.12	ug/m3	0.096	1	02/27/15 08:34	02/27/15 14:24	95-47-6	
Surrogates								
Chlorobenzene-d5 (S)	110	%.		1	02/27/15 08:34	02/27/15 14:24	3114-55-4	





QUALITY CONTROL DATA

Project: WEST LAKE LANDFILL

Pace Project No.: 60188508

Date: 03/19/2015 04:40 PM

 QC Batch:
 AIR/22603
 Analysis Method:
 TO-17M

 QC Batch Method:
 TO-17M
 Analysis Description:
 TO17 MSS AIR

 Associated Lab Samples:
 60188508001, 60188508002, 60188508004, 60188508005, 60188508007

METHOD BLANK: 1908303 Matrix: Air

Associated Lab Samples: 60188508001, 60188508002, 60188508004, 60188508005, 60188508007

		Blank	Reporting		
Parameter	Units	Result	Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	ND	0.24	02/27/15 11:02	
1,3,5-Trimethylbenzene	ug/m3	ND	0.24	02/27/15 11:02	
cis-1,2-Dichloroethene	ug/m3	ND	0.096	02/27/15 11:02	
Ethylbenzene	ug/m3	ND	0.096	02/27/15 11:02	
Isopropylbenzene (Cumene)	ug/m3	ND	0.24	02/27/15 11:02	
m&p-Xylene	ug/m3	ND	0.19	02/27/15 11:02	
Methyl-tert-butyl ether	ug/m3	ND	0.096	02/27/15 11:02	
o-Xylene	ug/m3	ND	0.096	02/27/15 11:02	
Tetrachloroethene	ug/m3	ND	0.24	02/27/15 11:02	
trans-1,2-Dichloroethene	ug/m3	ND	0.096	02/27/15 11:02	
Trichloroethene	ug/m3	ND	0.24	02/27/15 11:02	
Vinyl chloride	ug/m3	ND	0.096	02/27/15 11:02	
Chlorobenzene-d5 (S)	%.	99		02/27/15 11:02	

LABORATORY CONTROL SAMPLE	: 1908304					
		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	.15	.16J	103	72-137	
1,3,5-Trimethylbenzene	ug/m3	.15	.15J	101	73-134	
cis-1,2-Dichloroethene	ug/m3	.1	0.11	106	70-139	
Ethylbenzene	ug/m3	.11	0.12	106	63-140	
Isopropylbenzene (Cumene)	ug/m3	.13	.14J	108	75-135	
m&p-Xylene	ug/m3	.22	0.24	106	65-137	
Methyl-tert-butyl ether	ug/m3	.082	.091J	111	41-150	
o-Xylene	ug/m3	.12	0.12	104	64-139	
Tetrachloroethene	ug/m3	.18	.19J	106	64-141	
trans-1,2-Dichloroethene	ug/m3	.1	0.11	108	70-130	
Trichloroethene	ug/m3	.14	.14J	104	73-136	
Vinyl chloride	ug/m3	.067	.078J	116	59-150	
Chlorobenzene-d5 (S)	%.			99		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.



QUALITY CONTROL DATA

Project: WEST LAKE LANDFILL

Pace Project No.: 60188508

Date: 03/19/2015 04:40 PM

QC Batch: AIR/22740 Analysis Method: TO-17M
QC Batch Method: TO-17M Analysis Description: TO17 MSS AIR

Associated Lab Samples: 60188508003, 60188508006

METHOD BLANK: 1918758 Matrix: Air

Associated Lab Samples: 60188508003, 60188508006

		Blank	Reporting		
Parameter	Units	Result	Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	ND ND	0.096	03/18/15 10:15	
1,3,5-Trimethylbenzene	ug/m3	ND	0.096	03/18/15 10:15	
Benzene	ug/m3	ND	0.096	03/18/15 10:15	CL
cis-1,2-Dichloroethene	ug/m3	ND	0.19	03/18/15 10:15	CL,L2
Ethylbenzene	ug/m3	ND	0.096	03/18/15 10:15	L2
Isopropylbenzene (Cumene)	ug/m3	ND	0.096	03/18/15 10:15	
m&p-Xylene	ug/m3	ND	0.19	03/18/15 10:15	L2
Methyl-tert-butyl ether	ug/m3	ND	0.096	03/18/15 10:15	CL,L2
o-Xylene	ug/m3	ND	0.096	03/18/15 10:15	L2
Tetrachloroethene	ug/m3	ND	0.096	03/18/15 10:15	
Toluene	ug/m3	ND	0.096	03/18/15 10:15	CL,L2
trans-1,2-Dichloroethene	ug/m3	ND	0.096	03/18/15 10:15	CL,L2
Trichloroethene	ug/m3	ND	0.096	03/18/15 10:15	CL
Vinyl chloride	ug/m3	ND	0.62	03/18/15 10:15	CL,L2
a,a,a-Trifluorotoluene (S)	%.	53	38-150	03/18/15 10:15	

LABORATORY CONTROL SAMPLE &	LCSD: 1918759	9	19	18760						
		Spike	LCS	LCSD	LCS	LCSD	% Rec		Max	
Parameter	Units	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	RPD	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	.099	.093J	80.2	93	80	53-125		30	
1,3,5-Trimethylbenzene	ug/m3	.099	.086J	74.9	87	74	61-125		30	
Benzene	ug/m3	.062	ND	20.0	47	32	30-150		30	CL,R1
cis-1,2-Dichloroethene	ug/m3	.064	ND	11.9	34	18	30-150		30	CL,L0,R1
Ethylbenzene	ug/m3	.073	.048J	41.3	66	56	62-135		30	L0
Isopropylbenzene (Cumene)	ug/m3	.085	.066J	57.3	78	66	63-135		30	
m&p-Xylene	ug/m3	.15	.095J	85.0	62	55	61-128		30	L0
Methyl-tert-butyl ether	ug/m3	.076	ND	8.4	20	11	30-150		30	CL,L0,R1
o-Xylene	ug/m3	.071	.042J	37.3	59	52	60-125		30	L0
Tetrachloroethene	ug/m3	.084	.063J	51.4	75	60	54-139		30	
Toluene	ug/m3	.067	.038J	30.2	56	44	58-134		30	CL,L0
trans-1,2-Dichloroethene	ug/m3	.064	ND	7.8	23	12	30-150		30	CL,L0,R1
Trichloroethene	ug/m3	.072	.045J	34.2	63	47	40-150		30	CL
Vinyl chloride	ug/m3	.16	ND	8.3	10	5	30-150		30	CL,L0,R1
a,a,a-Trifluorotoluene (S)	%.				58	40	38-150		30	S0

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.



QUALIFIERS

Project: WEST LAKE LANDFILL

Pace Project No.: 60188508

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

ANALYTE QUALIFIERS

Date: 03/19/2015 04:40 PM

CL	The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased
	low.

- L0 Analyte recovery in the laboratory control sample (LCS) was outside QC limits.
- L2 Analyte recovery in the laboratory control sample (LCS) was below QC limits. Results may be biased low.
- R1 RPD value was outside control limits.
- S0 Surrogate recovery outside laboratory control limits.

(913)599-5665



QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: WEST LAKE LANDFILL

Pace Project No.: 60188508

Date: 03/19/2015 04:40 PM

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60188508001	WAA-01-RV-PS-20150220	TO-17M	AIR/22603	TO-17M	AIR/22604
60188508002	WAA-02-RV-PS-20150220	TO-17M	AIR/22603	TO-17M	AIR/22604
60188508004	WAA-04-RV-PS-20150220	TO-17M	AIR/22603	TO-17M	AIR/22604
60188508005	WAA-05-RV-PS-20150220	TO-17M	AIR/22603	TO-17M	AIR/22604
60188508007	WAA-00-RV-TB-20150220	TO-17M	AIR/22603	TO-17M	AIR/22604
60188508003	WAA-03-RV-PS-20150220	TO-17M	AIR/22740	TO-17M	AIR/22741
60188508006	WAA-04-RV-DU-20150220	TO-17M	AIR/22740	TO-17M	AIR/22741

Courter Courter Commercial Courter Courter	
Courter Fed Ex	
Custody Seal on Cooler/Box Present? Gesting Material: Bubble Wrap Bubble Bags Foam None Other: Temp Blank rec: Temp Blan	-divi
Custody Seal on Cooler/Box Present? Ves	
Packing Material: Bubble Wrap Bubble Bags Foam None Other: Temp Blank rec;	
Temp, Includ be above freeing to 6°C Correction Factor: Include the solution of Custody Presents of 6°C Correction Factor: Include the solution of Custody Presents of 6°C Correction Factor: Include the solution of Custody Presents of Comments: Chain of Custody Present?	Yes 🔲
Comments: Comments:	
Chain of Custody Present?	
Chain of Custody Filled Out?	
Chain of Custody Relinquished? Sampler Name and/or Signature on COC? Yes No N/A 4. Samples Arrived within Hold Time? Short Hold Time Analysis (-72 hr)? Rush Turn Around Time Requested? Sufficient Volume? Correct Containers Used? Containers Used? Containers Intact? Media: Sample Backis Match COC? Samples Received: Canisters Canisters Flow Controllers Stand Alone G Sample Number Can ID Sample Number Can ID	
Sampler Name and/or Signature on COC? Yes	
Samples Arrived within Hold Time? Short Hold Time Analysis (<72 hr)? Rush Turn Around Time Requested? Sufficient Volume? Sufficient Volume? Correct Containers Used? Pace Containers Used? Pace Containers Intact? Media: Sample Labels Match COC? Sample Number Can ID Sample Number Can ID Sample Number Can II Sample Number Can III	
Short Hold Time Analysis (<72 hr)? Rush Turn Around Time Requested? Rush Turn Around Time Requested? Sufficient Volume? Sufficient Volume? Sufficient Volume? Supres No N/A 8. Correct Containers Used? Pace Containers Used? Pace Containers Used? Supres No N/A 9. Pace Containers Intact? Nyes No N/A 10. Media: Sample Labels Match COC? Supres No N/A 12. Samples Received: Canlsters Flow Controllers Stand Alone G Sample Number Can ID Sample Number Can ID Sample Number Can ID Sample Number Can ID	
Rush Turn Around Time Requested?	
Sufficient Volume? Correct Containers Used? -Pace Containers Used? -Pace Containers Intact? Nyes No NA -Pace Containers Intact? Nyes No NA -Pace Containers Intact? Nyes No NA	
Correct Containers Used? -Pace Containers Used? -Pace Containers Intact? No N/A -Pace Containers Intact? No N/A -Pace Containers Intact? No N/A -Pace Containers Used? No N/A -Pace Containers Used? No N/A	
Pace Containers Used? Ves	
Containers Intact? Nes	77.
Media:	
Media:	
Samples Received: Canlsters Flow Controllers Stand Alone G Sample Number Can ID Sample Number Can ID Sample Number Can ID Sample Number Can ID Sample Number Can ID	ì
Canlsters Flow Controllers Stand Alone G Sample Number Can ID Sample Number Can ID Sample Number Can ID Sample Number Can ID Sample Number Can ID	
Sample Number Can ID Sample Number Can ID Sample Number Can ID	
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CLIENT NOTIFICATION/RESOLUTION Person Contacted: Date/Time:	0
Comments/Resolution:	
Project Manager Review:	
ote: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Officeld, incorrect preservative, out of temp, incorrect containers)	fice (i.e o



CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section Require	n A d Client Information:	Section B		Inform	nation:					ction C	nation:							Pag	je: 1	of	1
Compar	y: Tetra Tech EMI	Report To:	Emil	y Fish	ner				-	ention:	Emily Fisher							_			
Address	415 Oak	Сору То:							Cor	mpany Nar	me: Tetra Tech				REG	III ATO	RY AGENO	v	E 27.9	Solary Conja	Settle - Const
	Kansas City, MO 64106								Add	lress:	415 Oak St, Kansa	s Cit	y, MC	64106	_	J-42 3 11-1	☐ GROU		ATER [DRINKING	MATER
Email To	Emily.Fisher@tetratech.com	Purchase 0	Order N	No.:	1111499					Quola		-			-1	UST	□ RCRA			OTHER	WATER
Phone:	(816) 412-1755 Fax:	Project Nar							Page	rence: Project	Sherri Rosenstang	le	_		1777	V. 3			VIIIII	UTHER	
	ted Due Date/TAT:	Project Nur							Man	ager. a Profile #:	25.5 (15.1)	10			- Site	e Location	M	0			
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					-				_	7		and.	111111111111	equested	Anah	ysis Filte	red (Y/N)	- 6			
	Section D Valid Matrix (Required Client Information MATRIX	Codes CODE	o left	DMP		COLL	ECTED		ଜ	18		N/A									
	DRINKING WATER WATER WASTE WATER PRODUCT SOILSOUD OIL WIPE	DW WT WW P SL OL WP AR	(see valid codes to left)	(G*GRAB C=COMP)	8AMPLIN DATE/T	G END IMÉ	SAMPLING DATE/T	S END BAE	TIME (MINUTE	ING TEMPERAT	TUBE SERIAL NUMBER							100	(VIV)	00	an B
ITEM#	(A-Z, 0-9 / -) AR OTHER Sample IDs MUST BE UNIQUE TISSUE	of TS	MATRIX CODE	SAMPLE TYPE (DATE	TIME	DATE	TIME	TOTAL SAMPLING TIME (MINUTES)	AVERAGE SAMPLING TEMPERATURE (°C)	NUMBER	Analysis Test	TO-17 Passive					(AV) extended (arteface)	Yesiqual Culou Page Page Page Page Page Page Page Page	Se Project A	
1	WAA-01-RV-PS-20150220		AR		2/13/15	13:54	2/20/15	13:00	10026	-7.2	278FI	100	х					П			
2	WAA-02-RV-PS-20150220		AR		2/13/15	13:03	2/20/15	12:07	10024	-7.2	783BN		x		\Box						
3	WAA-03-RV-PS-20150220		AR		2/13/15	13:30	2/20/15	12:32	10022	-7.2	727KA	12	x								
4	WAA-04-RV-PS-20150220		AR		2/13/15	13:42	2/20/15	12:50	10028	-7.2	792BN	100	x		TI						
5	WAA-05-RV-PS-20150220		AR		2/13/15	13:16	2/20/15	12:20	10024	-7.2	207FG		x								
6	WAA-04-RV-DU-20150220		AR		2/13/15	13:42	2/20/15	12:50	10028	-7.2	196FG	100	x								
-7	WAA-00-RV-TB-20150220		AR		2/13/15	12:54	2/20/15	13:10	NA	NA	204FG		х							1111	
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т.						AN TENDEN	Linear	ND SIGNA e of SAMPL	e new one				137					Temp in °C	Received on Ice (Y/N)	Custody Sealed Coole (Y/N)	Samples Intact (Y/N)
Pag							SIGNATUR	E of SAMPL	ER:					TE Signed				Te Te	88 a	Saali	Samp

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	Pace Analytical Services, Inc. (Lenexa, Kansas)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 16, 2015
Sample Delivery Group (SDG): Sample Numbers:	60189050 WAA-01-RV-PS-20150227, WAA-02-RV-PS-20150227, WAA-03-RV-PS-20150227, WAA-04-RV-PS-20150227, WAA-04-RV-DU-20150227, WAA-05-RV-PS-20150227, and WAA-00-RV-TB-20150228
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank
documents entitled "Contract Labor Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pacthat were found, and data qualifications.	o the U.S. Environmental Protection Agency (EPA) Region 7 atory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data
· · · · · · · · · · · · · · · · · · ·	alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Elli	16 April 2015
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) 60189050 included five (5) environmental air (adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for selected volatile organic compounds via EPA Air Method TO-17. The following summarizes the data validation that was performed.

VOLATILE ORGANIC COMPOUND ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) blank. The field blank yielded low concentrations of five aromatic hydrocarbons, similar to the results in SDG No. 60188508. No analytes were detected in the field samples so no qualifications were applied.

IV. Laboratory Control Sample (LCS)

All LCS results were within QC limits. No qualifications were applied.

V. Surrogates

All surrogate recoveries were within QC limits. No qualifications were applied.

VI. Comments

No analytes were detected in the field samples.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.





March 24, 2015

Emily Fisher TETRA TECH EMI 415 Oak Kansas City, MO 64106

RE: Project: WEST LAKE LANDFILL Pace Project No.: 60189050

Dear Emily Fisher:

Enclosed are the analytical results for sample(s) received by the laboratory on March 04, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Shui Dosenstangle

Sherri Rosenstangle sherri.rosenstangle@pacelabs.com Project Manager

Enclosures



9608 Loiret Blvd. Lenexa, KS 66219 (913)599-5665



CERTIFICATIONS

Project: WEST LAKE LANDFILL

Pace Project No.: 60189050

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414

A2LA Certification #: 2926.01 Alaska Certification #: UST-078 Alaska Certification #MN00064 Alabama Certification #40770 Arizona Certification #: AZ-0014 Arkansas Certification #: 88-0680 California Certification #: 01155CA Colorado Certification #Pace Connecticut Certification #: PH-0256

EPA Region 8 Certification #: 8TMS-L Florida/NELAP Certification #: E87605

Guam Certification #:14-008r Georgia Certification #: 959 Georgia EPD #: Pace

Idaho Certification #: MN00064 Hawaii Certification #MN00064 Illinois Certification #: 200011 Indiana Certification#C-MN-01 Iowa Certification #: 368

Kansas Certification #: E-10167 Kentucky Dept of Envi. Protection - DW #90062 Kentucky Dept of Envi. Protection - WW #:90062

Louisiana DEQ Certification #: 3086 Louisiana DHH #: LA140001 Maine Certification #: 2013011 Maryland Certification #: 322 Michigan DEPH Certification #: 9909 Mississippi Certification #: Pace Montana Certification #: MT0092 Nevada Certification #: MN_00064 Nebraska Certification #: Pace

Minnesota Certification #: 027-053-137

New Jersey Certification #: MN-002 New York Certification #: 11647 North Carolina Certification #: 530

North Carolina State Public Health #: 27700

North Dakota Certification #: R-036

Ohio EPA #: 4150 Ohio VAP Certification #: CL101 Oklahoma Certification #: 9507 Oregon Certification #: MN200001 Oregon Certification #: MN300001 Pennsylvania Certification #: 68-00563

Puerto Rico Certification Saipan (CNMI) #:MP0003 South Carolina #:74003001 Texas Certification #: T104704192 Tennessee Certification #: 02818 Utah Certification #: MN000642013-4 Virginia DGS Certification #: 251 Virginia/VELAP Certification #: Pace Washington Certification #: C486 West Virginia Certification #: 382 West Virginia DHHR #:9952C

Wisconsin Certification #: 999407970



SAMPLE SUMMARY

Project: WEST LAKE LANDFILL

Pace Project No.: 60189050

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60189050001	WAA-01-RV-PS-201502227	Air	02/27/15 12:13	03/04/15 10:40
60189050002	WAA-02-RV-PS-201502227	Air	02/27/15 11:24	03/04/15 10:40
60189050003	WAA-03-RV-PS-201502227	Air	02/27/15 11:50	03/04/15 10:40
60189050004	WAA-04-RV-PS-201502227	Air	02/27/15 12:03	03/04/15 10:40
60189050005	WAA-05-RV-PS-201502227	Air	02/27/15 11:37	03/04/15 10:40
60189050006	WAA-04-RV-DU-201502227	Air	02/27/15 12:03	03/04/15 10:40
60189050007	WAA-00-RV-TB-201502227	Air	02/27/15 12:20	03/04/15 10:40

(913)599-5665



SAMPLE ANALYTE COUNT

Project: WEST LAKE LANDFILL

Pace Project No.: 60189050

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60189050001	WAA-01-RV-PS-201502227	TO-17M	RTP	13	PASI-M
60189050002	WAA-02-RV-PS-201502227	TO-17M	RTP	13	PASI-M
60189050003	WAA-03-RV-PS-201502227	TO-17M	RTP	13	PASI-M
60189050004	WAA-04-RV-PS-201502227	TO-17M	RTP	13	PASI-M
60189050005	WAA-05-RV-PS-201502227	TO-17M	RTP	13	PASI-M
60189050006	WAA-04-RV-DU-201502227	TO-17M	RTP	13	PASI-M
60189050007	WAA-00-RV-TB-201502227	TO-17M	RTP	13	PASI-M



Project:

WEST LAKE LANDFILL

Pace Project No.:

60189050

Sample: WAA-01-RV-PS-201502227	Lab ID: 601	89050001	Collected: 02/27/1	5 12:13	Received: 03	3/04/15 10:40 M	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meth	nod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 13:39	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 13:39	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 13:39	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 13:39	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 13:39	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 13:39	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 13:39	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 13:39	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 13:39	108-67-8	
Vinyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 13:39	75-01-4	
m&p-Xylene	ND	ug/m3	0.81	4.21	03/19/15 07:14	03/19/15 13:39	179601-23-1	
o-Xylene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 13:39	95-47-6	
Surrogates								
Chlorobenzene-d5 (S)	85	%.	70-130	4.21	03/19/15 07:14	03/19/15 13:39	3114-55-4	

16 April 2015



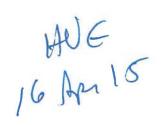
Project:

WEST LAKE LANDFILL

Pace Project No.:

Date: 03/24/2015 08:31 AM

Sample: WAA-02-RV-PS-201502227	Lab ID: 601	89050002	Collected: 02/27/	15 11:24	Received: 03	/04/15 10:40 N	/latrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Met	hod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:10	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:10	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:10	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 14:10	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:10	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 14:10	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 14:10	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 14:10	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 14:10	108-67-8	
Vinyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:10	75-01-4	
m&p-Xylene	ND	ug/m3	0.81	4.21	03/19/15 07:14	03/19/15 14:10	179601-23-1	
o-Xylene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:10	95-47-6	
Surrogates Chlorobenzene-d5 (S)	92	%.	70-130	4.21	03/19/15 07:14	03/19/15 14:10	3114-55-4	





Project

WEST LAKE LANDFILL

Pace Project No.:

Sample: WAA-03-RV-PS-201502227	Lab ID: 601	89050003	Collected: 02/27/1	5 11:50	Received: 03	/04/15 10:40 I	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meth	nod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:45	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:45	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:45	5 100-41-4	
Isopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 14:45	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:45	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 14:45	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 14:45	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 14:45	5 95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 14:45	108-67-8	
Vinyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:45	75-01-4	
m&p-Xylene	ND	ug/m3	0.81	4.21	03/19/15 07:14	03/19/15 14:45	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 14:45	5 95-47-6	
Chlorobenzene-d5 (S)	90	%.	70-130	4.21	03/19/15 07:14	03/19/15 14:45	3114-55-4	



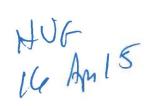


Project:

WEST LAKE LANDFILL

Pace Project No.:

Sample: WAA-04-RV-PS-201502227	Lab ID: 601	89050004	Collected: 02/27/	15 12:03	Received: 03	3/04/15 10:40 M	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meth	nod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:16	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:16	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:16	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 15:16	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:16	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 15:16	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 15:16	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 15:16	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 15:16	108-67-8	
Vinyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:16	75-01-4	
m&p-Xylene	ND	ug/m3	0.81	4.21	03/19/15 07:14	03/19/15 15:16	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:16	95-47-6	
Chlorobenzene-d5 (S)	93	%.	70-130	4.21	03/19/15 07:14	03/19/15 15:16	3114-55-4	





Project:

WEST LAKE LANDFILL

Pace Project No.:

Sample: WAA-05-RV-PS-201502227	Lab ID: 601	89050005	Collected: 02/27/	15 11:37	Received: 03	/04/15 10:40 N	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qua
TO17M VOC MS AIR Passive	Analytical Meti	nod: TO-17N	Preparation Meth	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:47	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:47	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:47	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 15:47	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:47	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 15:47	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 15:47	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 15:47	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 15:47	108-67-8	
Vinyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:47	75-01-4	
m&p-Xylene	ND	ug/m3	0.81	4.21	03/19/15 07:14	03/19/15 15:47	179601-23-1	
o-Xylene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 15:47	95-47-6	
Surrogates		•						
Chlorobenzene-d5 (S)	94	%.	70-130	4.21	03/19/15 07:14	03/19/15 15:47	3114-55-4	



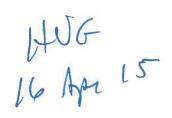


Project: WEST LAKE LANDFILL

Pace Project No.: 60189050

Date: 03/24/2015 08:31 AM

Sample: WAA-04-RV-DU-201502227	Lab ID: 601	89050006	Collected: 02/27/	15 12:03	Received: 03	3/04/15 10:40 N	fatrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Met	hod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 16:18	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 16:18	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 16:18	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 16:18	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 16:18	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 16:18	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 16:18	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 16:18	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1,0	4.21	03/19/15 07:14	03/19/15 16:18	108-67-8	
Vinyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 16:18	75-01-4	
m&p-Xylene	ND	ug/m3	0.81	4.21	03/19/15 07:14	03/19/15 16:18	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 16:18	95-47-6	
Chlorobenzene-d5 (S)	98	%.	70-130	4.21	03/19/15 07:14	03/19/15 16:18	3114-55-4	



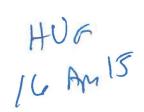


Project:

WEST LAKE LANDFILL

Pace Project No.: 60189050

Sample: WAA-00-RV-TB-201502227	Lab ID: 601	89050007	Collected: 02/27/1	5 12:20	Received: 03	/04/15 10:40 M	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meth	nod: TO-17N	Preparation Metho	d: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.096	1	03/19/15 07:14	03/19/15 12:41	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.096	1	03/19/15 07:14	03/19/15 12:41	156-60-5	
Ethylbenzene	0.22	ug/m3	0.096	1	03/19/15 07:14	03/19/15 12:41	100-41-4	
sopropylbenzene (Cumene)	0.72	ug/m3	0.24	1	03/19/15 07:14	03/19/15 12:41	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.096	1	03/19/15 07:14	03/19/15 12:41	1634-04-4	
Tetrachloroethene	ND	ug/m3	0.24	1	03/19/15 07:14	03/19/15 12:41	127-18-4	
Trichloroethene	ND	ug/m3	0.24	1	03/19/15 07:14	03/19/15 12:41	79-01-6	
1,2,4-Trimethylbenzene	0.48	ug/m3	0.24	1	03/19/15 07:14	03/19/15 12:41	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	0.24	1	03/19/15 07:14	03/19/15 12:41	108-67-8	
Vinyl chloride	ND	ug/m3	0.096	1	03/19/15 07:14	03/19/15 12:41	75-01-4	
m&p-Xylene	1.0	ug/m3	0.19	1	03/19/15 07:14	03/19/15 12:41	179601-23-1	
o-Xylene	0.46	ug/m3	0.096	1	03/19/15 07:14	03/19/15 12:41	95-47-6	
Surrogates		100						
Chlorobenzene-d5 (S)	84	%.	70-130	1	03/19/15 07:14	03/19/15 12:41	3114-55-4	





QUALITY CONTROL DATA

Project: WEST LAKE LANDFILL

Pace Project No.: 60189050

Date: 03/24/2015 08:31 AM

QC Batch: AIR/22767 Analysis Method: TO-17M
QC Batch Method: TO-17M Analysis Description: TO17 MSS AIR

Associated Lab Samples: 60189050001, 60189050002, 60189050003, 60189050004, 60189050005, 60189050006, 60189050007

METHOD BLANK: 1921104 Matrix: Air

Associated Lab Samples: 60189050001, 60189050002, 60189050003, 60189050004, 60189050005, 60189050006, 60189050007

		Blank	Reporting		
Parameter	Units	Result	Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	ND ND	0.24	03/19/15 12:07	
1,3,5-Trimethylbenzene	ug/m3	ND	0.24	03/19/15 12:07	
cis-1,2-Dichloroethene	ug/m3	ND	0.096	03/19/15 12:07	
Ethylbenzene	ug/m3	ND	0.096	03/19/15 12:07	
Isopropylbenzene (Cumene)	ug/m3	ND	0.24	03/19/15 12:07	
m&p-Xylene	ug/m3	ND	0.19	03/19/15 12:07	
Methyl-tert-butyl ether	ug/m3	ND	0.096	03/19/15 12:07	
o-Xylene	ug/m3	ND	0.096	03/19/15 12:07	
Tetrachloroethene	ug/m3	ND	0.24	03/19/15 12:07	
trans-1,2-Dichloroethene	ug/m3	ND	0.096	03/19/15 12:07	
Trichloroethene	ug/m3	ND	0.24	03/19/15 12:07	
Vinyl chloride	ug/m3	ND	0.096	03/19/15 12:07	
Chlorobenzene-d5 (S)	%.	82	70-130	03/19/15 12:07	

LABORATORY CONTROL SAMPLE:	1921105					
		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	.15	.18J	116	72-137	
1,3,5-Trimethylbenzene	ug/m3	.15	.18J	116	73-134	
cis-1,2-Dichloroethene	ug/m3	.1	0.11	108	70-139	
Ethylbenzene	ug/m3	.12	0.14	124	63-140	
Isopropylbenzene (Cumene)	ug/m3	.13	.16J	123	75-135	
m&p-Xylene	ug/m3	.22	0.27	123	65-137	
Methyl-tert-butyl ether	ug/m3	.082	0.098	119	41-150	
o-Xylene	ug/m3	.12	0.15	122	64-139	
Tetrachloroethene	ug/m3	.18	.21J	117	64-141	
trans-1,2-Dichloroethene	ug/m3	.1	0.11	109	70-130	
Trichloroethene	ug/m3	.14	.14J	102	73-136	
Vinyl chloride	ug/m3	.067	.07J	105	59-150	
Chlorobenzene-d5 (S)	%.			84	70-130	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.



QUALIFIERS

Project: WEST LAKE LANDFILL

Pace Project No.: 60189050

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

Date: 03/24/2015 08:31 AM

PASI-M Pace Analytical Services - Minneapolis



QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: WEST LAKE LANDFILL

Pace Project No.: 60189050

Date: 03/24/2015 08:31 AM

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60189050001	WAA-01-RV-PS-201502227	TO-17M	AIR/22767	TO-17M	AIR/22768
60189050002	WAA-02-RV-PS-201502227	TO-17M	AIR/22767	TO-17M	AIR/22768
60189050003	WAA-03-RV-PS-201502227	TO-17M	AIR/22767	TO-17M	AIR/22768
60189050004	WAA-04-RV-PS-201502227	TO-17M	AIR/22767	TO-17M	AIR/22768
60189050005	WAA-05-RV-PS-201502227	TO-17M	AIR/22767	TO-17M	AIR/22768
60189050006	WAA-04-RV-DU-201502227	TO-17M	AIR/22767	TO-17M	AIR/22768
60189050007	WAA-00-RV-TB-201502227	TO-17M	AIR/22767	TO-17M	AIR/22768

Pe) ace Analytical "	Docun Air Sample Con Docu F-MN-A	ec2013 Office			
ir Sample Condition C Upon Receipt	illent Name: te trateuh		Project #	WO	#:60189	050
_	Fed Ex	□USPS □ □Other: 7680	Client	6018	9050	
Custody Seal on Cooler/	Box Present? Yes	□No Seals	s Intact?	Yes No	Optional: Proj. Due Date:	Proj. Name:
acking Material: Bu	11 0	Bags Foam Corrected Temp (°C):]None . [Other:	Temp	Blank rec: Yes No
	zing to 6°C Correction Fac	1 . 4 . 2		Thermom. Used: Date & Initials of	B88A9132521491 Person Examining Contents:	Q 3415
				<u> </u>	Comments:	
Chain of Custody Present		Yes No		1.		
Chain of Custody Filled O	ut?	Yes No		2.		
Chain of Custody Relinqu	ished?	Yes No	o N/A	3.		
Sampler Name and/or Sig	gnature on COC?	Yes 🗆 No	o 🔲 N/A	4,		
Samples Arrived within H	lold Time?	Yes No	o N/A	5		
Short Hold Time Analysis	s (<72 hr)?	□Yes `□No	o 🔲 N/A	6.		
Rush Turn Around Time	Requested?	☐Yes ☐No	o N/A	7.		
Sufficient Volume?		Yes 🗆 Ne	o 🔲 N/A	8.		
Correct Containers Used?	?	Yes No	o N/A	9,		
-Pace Containers Used	1?	Yes No				
Containers Intact?		Yes No	o □N/A	10.		
Media: TOT 1	PUTTIVE			11.		
Sample Labels Match CO		Dves □N	o _N/A	12.		
Samples Received:						
	isters	E1.	ow Controllers		hets	Alone G
	Can ID			Can ID		Can ID
Sample Number	Can ID	Sample Number		Can ID	Sample Number	Can ID
		-				
		1			-	
					 	
	^ · · · · · · · · · · · · · · · · · · ·					
LIENT NOTIFICATION/RI					Field Data Required?	
	acted:			Date/Time:		
Person Conta						
Person Cont. Comments/Resol	ution:					
Person Cont Comments/Resol	ution:					

Project Manager Review:

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, but of temp, incorrect containers)



CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

	d Client Information:	Section E Required		nformation:				145 3 655 556	tion C ce Informa	ation:								Pa	age:	1	ol	1
Compar		Report To:	Emily	Fisher				Atter	rtion:	Emily Fisher												
Address	415 Oak	Copy To:						Com	pany Nan	e: Tetra Tech					REGULATORY AGENCY							
	Kansas City, MO 64106					-		Addr	ess:	415 Oak St, Kansa	is Cit	y, N	0 6410	3	□ NF	DES	☐ GRO	UND W	JND WATER DRINKING WATER			
Email Te	: Emily.Fisher@tetratech.com	Purchase 0	Order N	0.: 111149	19			Pace Refer	Quote				117	\neg	r us	ST.	RCR	A			OTHER	
Phone:	(816) 412-1755 Faxc	Project Na	me: 1	West Lake	andfill	_	-	Pace	Project	Sherri Rosenstang	le			-	Site L	ocation	1		E			
Reques	ted Due Date/TAT:	Project Nu	mber.	_				Mana Pace		970.8		_		\dashv	W	STATE:	, N	MO	E			
-			-								L	* . 1	Reques	ed A	The war are	17 22 15 IB. C	ed (Y/N)	25.035	whi.			
	Section D Valid Matrix C Required Client Information MATRIX	codes	o teft)	OMP)	COLL	ECTED		ଜ	Z.E.		N.V.	-		Ī		Ĩ		П				
	DRINKING WATER WASTE WASTE WASTE WASTE WASTE WASTE WASTE PRODUCT SOLISOLID OIL CAREDI F. ED	DW W7 WW P SL OL WP	(see valid codes to left)	(GeGRAB CacoMp)	ING END	SAMPLIN DATE/	G END FLAE	TIME (MINUTE	NG TEMPERAT	TUBE SERIAL									ie (Y/N)			
ITEM#	SAMPLE ID WIPE (A-Z, 0-9 / ,-) AR CTHER Sample IDS MUST BE UNIQUE TISSUE	AR OT TS	CODE	SAMPLE TYPE (0	TIME	DATE	TIME	TOTAL SAMPLING TIME (MINUTES)	AVERAGE SAMPLING TEMPERATURE (°C)	NUMBER	Analysis Test	TO-17 Passive							Residual Chlorine (Y/N)			050
4	WAA-01-RV-PS-20150227		AR	2/20/15		2/27/15	12:13	10033	-5.0	176CY	100	x						\neg				
2	WAA-02-RV-PS-20150227		AR	2/20/15		2/27/15	11:24	10037	-5.0	177CY		X			+		\Box	\neg			- 57	
3	WAA-03-RV-PS-20150227		AR	2/20/15		2/27/15	11:50	10038	-5.0	178CY		x		1				П	\Box			
4	WAA-04-RV-PS-20150227		AR	2/20/15		2/27/15	12:03	10033	-5.0	179CY	100	x						П				
5	WAA-05-RV-PS-20150227		AR	2/20/13	12:20	2/27/15	11:37	10037	-5.0	180CY	1	X							П			
6	WAA-04-RV-DU-20150227		AR	2/20/15	12:50	2/27/15	12:03	10033	-5.0	181CY	*2.0	X									-1.0	
- 7	WAA-00-RV-TB-20150227		AR	2/20/15	10:30	2/27/15	12:20	NA	NA	182CY		X										
8																						
9												L										
10												L										
11											1	L										
12											- 1	L						\perp		Asi		
-53	ADDITIONAL COMMENTS		RELI	IQUISHED BY	AFFILIAT	ION	DATE		TIME	ACCEPTE	DBY	/ AF	FILIATION			DATE	TIME	7	3	54' SAME	LE CONDIT	IONS
		Tari	NE	Soulsen	/Tet	ra tech	3/2/1	5 12	CO	1 John W	50	a	e		3	415	104:	A	45	. у	4	4
			ノ							1	V			1.00				14,	4	,-	/	1
	70 70 100		1		CAMPI	ER NAME A	ND SIGNA	THE	P-2012	7 34 9 (440) 127 (35 37)	748.T.		ng Kara	ver	Market	5-55a	G1 14. 2.	48		-	10	Ę
					SHURPL		ne of SAMPI	C. Service	1901 1	447/67/845			- C. B.	CF. (141-16	1 10 31	of at a fr	Temph C		(N/V)	tody Cook	es Inta (N)
Page							E of SAMP						ATE Sign					- PE		Received on los (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (YIN)

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:

West Lake Landfill Site, Bridgeton, Missouri

Laboratory:	Pace Analytical Services, Inc. (Lenexa, Kansas)							
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)							
Review Date	April 16, 2015							
Sample Delivery Group (SDG):	60189577							
Sample Numbers:	WAA-01-RV-PS-20150306, WAA-02-RV-PS-20150306, WAA-03-RV-PS-20150306, WAA-04-RV-PS-20150306, WAA-04-RV-DU-20150306, WAA-05-RV-PS-20150306, and WAA-00-RV-TB-20150306							
Matrix / Number of Samples: 5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank								
The data were qualified according to the U.S. Environmental Protection Agency (EPA) Region 7 documents entitled "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review" (9240.1-48), June 2008. In addition, the Tetra Tech document "Review of Data Packages from Subcontracted Laboratories" (February 2002) was used along with other criteria specified in the applicable methods. The review was intended to identify problems and quality control (QC) deficiencies that were readily apparent from the summary data package. The following sections discuss any problems or deficiencies that were found, and data qualifications applied because of non-compliant QC. The data review was limited to the available field and laboratory QC information submitted with the project-specific data package.								
	didation criteria outlined in the above-referenced documents were de to the data accorded with those documents.							
Hang N. Elli	16 April 2015							
Certified by Harry Ellis, Chemist	Date							

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) 60189509 included five (5) environmental air (adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for selected volatile organic compounds via EPA Air Method TO-17. The following summarizes the data validation that was performed.

VOLATILE ORGANIC COMPOUND ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) blank or the field (trip) blank. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All LCS results were within QC limits. No qualifications were applied.

V. Surrogates

Due to laboratory error, three samples were not spiked with the surrogate solution. All other surrogate recoveries were within QC limits. No qualifications were applied.

VI. Comments

No analytes were detected in the field samples.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.





March 23, 2015

Emily Fisher TETRA TECH EMI 415 Oak Kansas City, MO 64106

RE: Project: WEST LAKE LANDFILL Pace Project No.: 60189577

Dear Emily Fisher:

Enclosed are the analytical results for sample(s) received by the laboratory on March 10, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Shuri Dosenstande

Sherri Rosenstangle sherri.rosenstangle@pacelabs.com Project Manager

Enclosures



9608 Loiret Blvd. Lenexa, KS 66219 (913)599-5665



CERTIFICATIONS

Project: WEST LAKE LANDFILL

Pace Project No.: 60189577

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414

A2LA Certification #: 2926.01 Alaska Certification #: UST-078 Alaska Certification #MN00064 Alabama Certification #40770 Arizona Certification #: AZ-0014 Arkansas Certification #: 88-0680 California Certification #: 01155CA Colorado Certification #Pace Connecticut Certification #: PH-0256

EPA Region 8 Certification #: 8TMS-L Florida/NELAP Certification #: E87605

Guam Certification #:14-008r Georgia Certification #: 959 Georgia EPD #: Pace

Idaho Certification #: MN00064 Hawaii Certification #MN00064 Illinois Certification #: 200011 Indiana Certification#C-MN-01 Iowa Certification #: 368

Kansas Certification #: E-10167 Kentucky Dept of Envi. Protection - DW #90062 Kentucky Dept of Envi. Protection - WW #:90062

Louisiana DEQ Certification #: 3086 Louisiana DHH #: LA140001 Maine Certification #: 2013011 Maryland Certification #: 322 Michigan DEPH Certification #: 9909 Minnesota Certification #: 027-053-137 Mississippi Certification #: Pace Montana Certification #: MT0092 Nevada Certification #: MN_00064

Nebraska Certification #: Pace New Jersey Certification #: MN-002 New York Certification #: 11647 North Carolina Certification #: 530

North Carolina State Public Health #: 27700

North Dakota Certification #: R-036

Ohio EPA #: 4150 Ohio VAP Certification #: CL101 Oklahoma Certification #: 9507 Oregon Certification #: MN200001 Oregon Certification #: MN300001 Pennsylvania Certification #: 68-00563

Puerto Rico Certification Saipan (CNMI) #:MP0003 South Carolina #:74003001 Texas Certification #: T104704192 Tennessee Certification #: 02818 Utah Certification #: MN000642013-4 Virginia DGS Certification #: 251 Virginia/VELAP Certification #: Pace Washington Certification #: C486 West Virginia Certification #: 382 West Virginia DHHR #:9952C

Wisconsin Certification #: 999407970



SAMPLE SUMMARY

Project: WEST LAKE LANDFILL

Pace Project No.: 60189577

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60189577001	WAA-01-RV-PS-20150306	Air	03/06/15 11:27	03/10/15 10:30
60189577002	WAA-02-RV-PS-20150306	Air	03/06/15 10:52	03/10/15 10:30
60189577003	WAA-03-RV-PS-20150306	Air	03/06/15 11:10	03/10/15 10:30
60189577004	WAA-04-RV-PS-20150306	Air	03/06/15 11:20	03/10/15 10:30
60189577005	WAA-05-RV-PS-20150306	Air	03/06/15 10:59	03/10/15 10:30
60189577006	WAA-04-RV-DU-20150306	Air	03/06/15 11:20	03/10/15 10:30
60189577007	WAA-00-RV-TB-20150306	Air	03/06/15 11:35	03/10/15 10:30

(913)599-5665



SAMPLE ANALYTE COUNT

Project: WEST LAKE LANDFILL

Pace Project No.: 60189577

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60189577001	WAA-01-RV-PS-20150306	TO-17M	RTP	13	PASI-M
60189577002	WAA-02-RV-PS-20150306	TO-17M	RTP	13	PASI-M
60189577003	WAA-03-RV-PS-20150306	TO-17M	RTP	13	PASI-M
60189577004	WAA-04-RV-PS-20150306	TO-17M	RTP	13	PASI-M
60189577005	WAA-05-RV-PS-20150306	TO-17M	RTP	13	PASI-M
60189577006	WAA-04-RV-DU-20150306	TO-17M	RTP	13	PASI-M
60189577007	WAA-00-RV-TB-20150306	TO-17M	RTP	13	PASI-M



Project:

WEST LAKE LANDFILL

Pace Project No.:

60189577

Sample: WAA-01-RV-PS-20150306	Lab ID: 601	89577001	Collected: 03/06/	15 11:27	Received: 03	/10/15 10:30 N	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Met	hod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 17:52	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 17:52	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 17:52	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 17:52	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 17:52	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 17:52	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 17:52	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 17:52	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 17:52	108-67-8	
/inyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 17:52	75-01-4	
m&p-Xylene	ND	ug/m3	0.81	4.21	03/19/15 07:14	03/19/15 17:52	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 17:52	95-47-6	
Chlorobenzene-d5 (S)	94	%.	70-130	4.21	03/19/15 07:14	03/19/15 17:52	3114-55-4	

16 April 2015



Project:

WEST LAKE LANDFILL

Pace Project No.:

60189577

Sample: WAA-02-RV-PS-20150306	Lab ID: 601	89577002	Collected: 03/06/1	5 10:52	Received: 03	/10/15 10:30 N	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meth	hod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:23	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:23	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:23	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 18:23	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:23	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 18:23	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 18:23	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 18:23	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 18:23	108-67-8	
Vinyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:23	75-01-4	
m&p-Xylene	ND	ug/m3	0.80	4.21	03/19/15 07:14	03/19/15 18:23	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:23	95-47-6	
Chlorobenzene-d5 (S)	96	%.	70-130	4.21	03/19/15 07:14	03/19/15 18:23	3114-55-4	

HUG 16 Aml T



Project:

WEST LAKE LANDFILL

Pace Project No.:

60189577

Sample: WAA-03-RV-PS-20150306	Lab ID: 601	89577003	Collected: 03/06/	15 11:10	Received: 03	/10/15 10:30 N	Matrix: Air	
Parameters	Results	Results Units Repor		DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meth	od: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:54	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:54	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:54	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 18:54	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:54	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 18:54	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 18:54	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 18:54	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/19/15 18:54	108-67-8	
Vinyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:54	75-01-4	
m&p-Xylene	ND	ug/m3	0.81	4.21	03/19/15 07:14	03/19/15 18:54	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/19/15 18:54	95-47-6	
Chlorobenzene-d5 (S)	98	%.	70-130	4.21	03/19/15 07:14	03/19/15 18:54	3114-55-4	





Project:

WEST LAKE LANDFILL

Pace Project No.:

60189577

Sample: WAA-04-RV-PS-20150306	Lab ID: 601	89577004	Collected: 03/06/	15 11:20	Received: 03	/10/15 10:30 N	latrix: Air
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No. Qu
TO17M VOC MS AIR Passive	Analytical Met	hod: TO-17N	Preparation Metho	od: TO-1	7M		
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:26	156-59-2
rans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:26	156-60-5
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:26	100-41-4
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 07:26	98-82-8
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:26	1634-04-4
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 07:26	127-18-4
Trichloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 07:26	79-01-6
,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 07:26	95-63-6
,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 07:26	108-67-8
/inyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:26	75-01-4
n&p-Xylene	ND	ug/m3	0.81	4.21	03/19/15 07:14	03/20/15 07:26	179601-23-1
o-Xylene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:26	95-47-6
Surrogates							
Chlorobenzene-d5 (S)	0	%.	70-130	4.21	03/19/15 07:14	03/20/15 07:26	3114-55-4 (1e)
						Lal	ens -

HUE 16 Apr 15 Lavera -



Project: WEST LAKE LANDFILL

Pace Project No.: 60189577

Sample: WAA-05-RV-PS-20150306	Lab ID: 601	89577005	Collected: 03/06/1	15 10:59	Received: 03	/10/15 10:30 N	fatrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Metl	nod: TO-17M	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:57	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:57	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:57	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 07:57	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:57	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 07:57	127-18-4	
richloroethene richloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 07:57	79-01-6	
,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 07:57	95-63-6	
,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 07:57	108-67-8	
/inyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:57	75-01-4	
n&p-Xylene	ND	ug/m3	0.80	4.21	03/19/15 07:14	03/20/15 07:57	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 07:57	95-47-6	
Chlorobenzene-d5 (S)	0	%.	70-130	4.21	03/19/15 07:14	03/20/15 07:57	3114-55-4	1e)



Date: 03/23/2015 02:11 PM



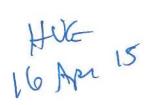
Project:

WEST LAKE LANDFILL

Date: 03/23/2015 02:11 PM

Pace Project No.: 60189577

Sample: WAA-04-RV-DU-20150306	Lab ID: 601	89577006	Collected: 03/06/1	15 11:20	Received: 03	/10/15 10:30 N	Aatrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
O17M VOC MS AIR Passive	Analytical Met	hod: TO-17N	Preparation Metho	od: TO-1	7M			
is-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 08:28	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 08:28	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 08:28	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 08:28	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 08:28	1634-04-4	
etrachloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 08:28	127-18-4	
richloroethene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 08:28	79-01-6	
,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 08:28	95-63-6	
,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/19/15 07:14	03/20/15 08:28	108-67-8	
/inyl chloride	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 08:28	75-01-4	
n&p-Xylene	ND	ug/m3	0.81	4.21	03/19/15 07:14	03/20/15 08:28	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.40	4.21	03/19/15 07:14	03/20/15 08:28	95-47-6	
Chlorobenzene-d5 (S)	0	%.	70-130	4.21	03/19/15 07:14	03/20/15 08:28	3114-55-4	(le)





Project:

WEST LAKE LANDFILL

Pace Project No.:

60189577

Sample: WAA-00-RV-TB-20150306	Lab ID: 60	189577007	Collected: 03/06/1	15 11:35	Received: 03	/10/15 10:30 N	/latrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Me	thod: TO-17N	Preparation Metho	d: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.096	1	03/19/15 07:14	03/19/15 17:05	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.096	1	03/19/15 07:14	03/19/15 17:05	156-60-5	
Ethylbenzene	ND	ug/m3	0.096	1	03/19/15 07:14	03/19/15 17:05	100-41-4	
Isopropylbenzene (Cumene)	ND	ug/m3	0.24	1	03/19/15 07:14	03/19/15 17:05	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.096	1	03/19/15 07:14	03/19/15 17:05	1634-04-4	
Tetrachloroethene	ND	ug/m3	0.24	1	03/19/15 07:14	03/19/15 17:05	127-18-4	
Trichloroethene	ND	ug/m3	0.24	1	03/19/15 07:14	03/19/15 17:05	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	0.24	1	03/19/15 07:14	03/19/15 17:05	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	0.24	1	03/19/15 07:14	03/19/15 17:05	108-67-8	
Vinyl chloride	ND	ug/m3	0.096	1	03/19/15 07:14	03/19/15 17:05	75-01-4	
m&p-Xylene	ND	ug/m3	0.19	1	03/19/15 07:14	03/19/15 17:05	179601-23-1	
o-Xylene	ND	ug/m3	0.096	1	03/19/15 07:14	03/19/15 17:05	95-47-6	
Surrogates		-						
Chlorobenzene-d5 (S)	94	%.	70-130	1	03/19/15 07:14	03/19/15 17:05	3114-55-4	





QUALITY CONTROL DATA

Project: WEST LAKE LANDFILL

Pace Project No.: 60189577

Date: 03/23/2015 02:11 PM

QC Batch: AIR/22767 Analysis Method: TO-17M
QC Batch Method: TO-17M Analysis Description: TO17 MSS AIR

Associated Lab Samples: 60189577001, 60189577002, 60189577003, 60189577004, 60189577005, 60189577006, 60189577007

METHOD BLANK: 1921104 Matrix: Air

Associated Lab Samples: 60189577001, 60189577002, 60189577003, 60189577004, 60189577005, 60189577006, 60189577007

		Blank	Reporting		
Parameter	Units	Result	Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	ND ND	0.24	03/19/15 12:07	
1,3,5-Trimethylbenzene	ug/m3	ND	0.24	03/19/15 12:07	
cis-1,2-Dichloroethene	ug/m3	ND	0.096	03/19/15 12:07	
Ethylbenzene	ug/m3	ND	0.096	03/19/15 12:07	
Isopropylbenzene (Cumene)	ug/m3	ND	0.24	03/19/15 12:07	
m&p-Xylene	ug/m3	ND	0.19	03/19/15 12:07	
Methyl-tert-butyl ether	ug/m3	ND	0.096	03/19/15 12:07	
o-Xylene	ug/m3	ND	0.096	03/19/15 12:07	
Tetrachloroethene	ug/m3	ND	0.24	03/19/15 12:07	
trans-1,2-Dichloroethene	ug/m3	ND	0.096	03/19/15 12:07	
Trichloroethene	ug/m3	ND	0.24	03/19/15 12:07	
Vinyl chloride	ug/m3	ND	0.096	03/19/15 12:07	
Chlorobenzene-d5 (S)	%.	82	70-130	03/19/15 12:07	

LABORATORY CONTROL SAMPLE:	1921105					
		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	.15	.18J	116	72-137	
1,3,5-Trimethylbenzene	ug/m3	.15	.18J	116	73-134	
cis-1,2-Dichloroethene	ug/m3	.1	0.11	108	70-139	
Ethylbenzene	ug/m3	.12	0.14	124	63-140	
Isopropylbenzene (Cumene)	ug/m3	.13	.16J	123	75-135	
m&p-Xylene	ug/m3	.22	0.27	123	65-137	
Methyl-tert-butyl ether	ug/m3	.082	0.098	119	41-150	
o-Xylene	ug/m3	.12	0.15	122	64-139	
Tetrachloroethene	ug/m3	.18	.21J	117	64-141	
trans-1,2-Dichloroethene	ug/m3	.1	0.11	109	70-130	
Trichloroethene	ug/m3	.14	.14J	102	73-136	
Vinyl chloride	ug/m3	.067	.07J	105	59-150	
Chlorobenzene-d5 (S)	%.			84	70-130	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.



QUALIFIERS

Project: WEST LAKE LANDFILL

Pace Project No.: 60189577

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

ANALYTE QUALIFIERS

Date: 03/23/2015 02:11 PM

1e Surrogate standard was not added to this sample tube due to instrument error. The addition of a surrogate standard is not required per the TO17 method.



QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: WEST LAKE LANDFILL

Pace Project No.: 60189577

Date: 03/23/2015 02:11 PM

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60189577001	WAA-01-RV-PS-20150306	TO-17M	AIR/22767	TO-17M	AIR/22768
60189577002	WAA-02-RV-PS-20150306	TO-17M	AIR/22767	TO-17M	AIR/22768
60189577003	WAA-03-RV-PS-20150306	TO-17M	AIR/22767	TO-17M	AIR/22768
60189577004	WAA-04-RV-PS-20150306	TO-17M	AIR/22767	TO-17M	AIR/22768
60189577005	WAA-05-RV-PS-20150306	TO-17M	AIR/22767	TO-17M	AIR/22768
60189577006	WAA-04-RV-DU-20150306	TO-17M	AIR/22767	TO-17M	AIR/22768
60189577007	WAA-00-RV-TB-20150306	TO-17M	AIR/22767	TO-17M	AIR/22768

	100		Air Sarr		nt Name: tion Upon R	eceipt		Document Revised: 26 Page 1 of 1	Dec2013
	/ Pace Analyt	ical"		Pocume F-MN-A-1				Issuing Authorit Pace Minnesota Qualit	
Air Sample Co Upon Rece		Pace KS			Project !	*: L	10#	:60189	577
Cou Tracking Num	urier: Fed Ex		□USPS □Other: 9 <i>७</i>	_	Client	60	1895		
Custody Seal	on Cooler/Box Presen	t? 🗆 Yes 🗆	No	Seals I	ntact? _	⊋√es	□No	Optional: Proj. Due vale.	1103
Packing Mater	ial: \Subble Wrap	Bubble Bags	Foan	n 🔲 N	one [Other:_		Ten	np Blank rec: Yes No
Temp should b	nd TO13 samples only) (°C	Correction Factor:	+O, (p (°C):	4.1	Thermon		B88A912167504 B88A9132521491 Person Examining Contents:	□72337080 □80512447 - 3 10 15
Type of Ice Rec	ceived Blue \(\sum \)Wi	et None			ā			Comments:	
Chain of Cust	tody Present?		Yes	□No	□N/A	1.			
Chain of Cust	tody Filled Out?		Yes	□No	□N/A	2.			
Chain of Cust	ody Relinquished?		Yes	□No	□N/A	3.			
Sampler Nam	ne and/or Signature on (COC?	Yes	□No	□N/A	4.			
Samples Arriv	ved within Hold Time?		Yes	□No	□N/A	5.			
Short Hold Ti	ime Analysis (<72 hr)?		Yes	No	□N/A	6.			
Rush Turn Ar	ound Time Requested?		□Yes	DNO	□n/a	7.			
Sufficient Vol	lume?		Yes	□No	□N/A	8.			131179
Correct Conta	ainers Used?		Yes	□No	□N/A	9.			
-Pace Cont	tainers Used?		Yes	□No	□N/A				
Containers In	tact?		Yes	□No	□N/A	10.			
Media:	101					11.			50.
Sample Label	s Match COC?		Yes	□No	□N/A	12.			- American Company
Samples Rece	eived:								
	Canisters			Flow	Controller	s	promise and	Stan	d Alone G
Sample N	lumber	Can ID	Sample N			Can ID)	Sample Number	Can ID
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					-		11		A!
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Project Manager Review:

Date/Time:

CLIENT NOTIFICATION/RESOLUTION

Person Contacted:

Comments/Resolution:

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

Field Data Required? Yes No



CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section	n A d Client Information:	Section Required		t Inform	nation:		E D			tion C	ation:							Pag	ge:	1	of	1
Compa	y: Tetra Tech EMI	Report To	: Emi	ly Fish	ner					ntion:	Emily Fisher				٦					-		
Address	× 415 Oak	Copy To:							Corr	прапу Мал	ne: Tetra Tech				DEGI	II ATOE	RY AGEN	cv-	8 070.05	AUT/E	2016A 1 18E 1	TEST CALL
	Kansas City, MO 64106	1			-	-			Add	ress:	415 Oak St, Kansa	as Cit	v. MC	64106	100	113 - 5 9 1 1	a - Total	Hall .	ATED	SF	DEIANGAG	MATER
Email T	e: Emily.Fisher@tetratech.com	Purchase	Order	No.:	1111499				Page	Page Quote						F NPDES F GROUND WATER F DRINKING WATER						VALER
Phone:	(816) 412-1755 Fax:	Project N			t Lake La				Page	rence: Project	Sherri Rosenstang	ile	_		T Tarrette	A	☐ RCR	4	V///		OTHER	
Reques	ted Due Date/TAT:	Project N						_	Manu	profile#:	Charles Carlo Carlo Carlo				- Site	Location		10				
											010.0	1100	i Di	Savet (2)	No.	STATE:	- J. AVAD	1 to 5.0 kg	- ////			
	Section D Valid Matrix 0	Cadoa	1 2				-		1	Tin		-	T T	questec	Analys	T T	red (Y/N)					
	Required Client Information MATRIX	CODE	to left	C=COMP)		COLL	ECTED		୍ଥିତ	15		Y/N										
	SAMPLE ID (A-Z, 0-9 / ,-) DRINKING WATER WASTE WATER PRODUCT SOLISOLID OIL WIPE AIR OTHER	DW WT WW P SL OL WP AR OT TS)E (see valid codes to left)	(G=GRAB	SAMPLIN DATE	G END TIME	Samplin Date/	G SND TIME	TOTAL SAMPLING TIME (MINUTES)	AVERAGE SAMPLING TEMPERATURE (°C)	TUBE SERIAL NUMBER	Test	ive						orine (Y/N)		1180	1577
ITEM#	Sample IDs MUST BE UNIQUE TISSUE	15	MATRIX CODE	SAMPLE TYPE	DATE	TIME	DATE	TIME	TOTAL SAMPLI	AVERAGE SAM		Analysis Test	TO-17 Passive	1					esidual			No./ Lab I.D.
1	WAA-01-RV-PS-20150306		AR		2/27/15	12:13	3/6/15	11:27	10034	-3.3	553NN		х	2.0				П				
2	WAA-02-RV-PS-20150306		AR		2/27/15	11:24	3/6/15	10:52	10048	-3.3	554NN		x									
3	WAA-03-RV-PS-20150306		AR		2/27/15	11:50	3/6/15	11:10	10040	-3.3	555NN	18	х			-						
4.	WAA-04-RV-PS-20150306		AR		2/27/15	12:03	3/6/15	11:20	10037	-3.3	556NN		x									
6	WAA-05-RV-PS-20150306		AR		2/27/15	11:37	3/6/15	10:59	10042	-3.3	557NN	- 4	х									
8	WAA-04-RV-DU-20150306		AR		2/27/15	12:03	3/6/15	11:20	10037	-3.3	558NN	100	x									
7	WAA-00-RV-TB-20150306		AR		2/27/15	10:45	3/6/15	11:35	NA.	NA	552NN		x									
8							1			_		£ 1						\perp				
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10										<u> </u>			Н	_ _ -	1-1-			+				
11										-		- 4	\vdash		1.			-	-			
12						3,57,7,591,7				1	7. 12. 5 T. 12. 5 V.	- m. (!)				159.568%			1_			
10	ADDITIONAL COMMENTS		THE PERSON NAMED IN	0	SHED BY /	OR STREET	1111	DATE	The Late	TIME	ACCEPTE	DBY	AFF	LIATION	2 60 196	DATE	TIME	de L	_	SAMP	LE CONDIT	ions
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ņ							PRINT Nan	1, 1867, 2070	LER:	moth		_	L De		D. M	The state of the		Temp in *C	Received on	(N/A)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/IN)
2							SIGNATUR	RE of SAMP	LER:	win	j Barbar	~	(MI	FE Signed A/DD/YY):	03/	09/1	5	ا ا	l &		ő	Sar

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:

West Lake Landfill Site, Bridgeton, Missouri

Laboratory:	Pace Analytical Services, Inc. (Lenexa, Kansas)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 9, 2015
Sample Delivery Group (SDG):	60190027
Sample Numbers:	WAA-01-RV-PS-20150313, WAA-02-RV-PS-20150313, WAA-03-RV-PS-20150313, WAA-04-RV-PS-20150313, WAA-04-RV-DU-20150313, WAA-05-RV-PS-20150313, and WAA-00-RV-TB-20150313
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank
documents entitled "Contract Labor Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pacthat were found, and data qualification.	o the U.S. Environmental Protection Agency (EPA) Region 7 atory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data
	didation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Elli	9 April 2015
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) 60190027 included five (5) environmental air (adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for selected volatile organic compounds via EPA Air Method TO-17. The following summarizes the data validation that was performed.

VOLATILE ORGANIC COMPOUND ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) blank and the field blank. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All LCS results were within QC limits. No qualifications were applied.

V. Surrogates

All surrogate recoveries were within QC limits. No qualifications were applied.

VI. Comments

One analyte was detected in two field samples and the field duplicate, slightly above the reporting limit. It may be present in the other samples at a concentration below the reporting limit.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.





March 27, 2015

Emily Fisher TETRA TECH EMI 415 Oak Kansas City, MO 64106

RE: Project: WEST LAKE LANDFILL Pace Project No.: 60190027

Dear Emily Fisher:

Enclosed are the analytical results for sample(s) received by the laboratory on March 18, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Shui Dosenstangle

Sherri Rosenstangle sherri.rosenstangle@pacelabs.com Project Manager

Enclosures



9608 Loiret Blvd. Lenexa, KS 66219 (913)599-5665



CERTIFICATIONS

Project: WEST LAKE LANDFILL

Pace Project No.: 60190027

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414

A2LA Certification #: 2926.01 Alaska Certification #: UST-078 Alaska Certification #MN00064 Alabama Certification #40770 Arizona Certification #: AZ-0014 Arkansas Certification #: 88-0680 California Certification #: 01155CA Colorado Certification #Pace

Connecticut Certification #: PH-0256 EPA Region 8 Certification #: 8TMS-L Florida/NELAP Certification #: E87605

Guam Certification #:14-008r Georgia Certification #: 959 Georgia EPD #: Pace

Idaho Certification #: MN00064 Hawaii Certification #MN00064 Illinois Certification #: 200011 Indiana Certification#C-MN-01 Iowa Certification #: 368

Kansas Certification #: E-10167 Kentucky Dept of Envi. Protection - DW #90062 Kentucky Dept of Envi. Protection - WW #:90062

Louisiana DEQ Certification #: 3086 Louisiana DHH #: LA140001 Maine Certification #: 2013011 Maryland Certification #: 322 Michigan DEPH Certification #: 9909 Minnesota Certification #: 027-053-137 Mississippi Certification #: Pace Montana Certification #: MT0092 Nevada Certification #: MN_00064

Nebraska Certification #: Pace New Jersey Certification #: MN-002 New York Certification #: 11647 North Carolina Certification #: 530 North Carolina State Public Health #: 27700

North Dakota Certification #: R-036

Ohio EPA #: 4150 Ohio VAP Certification #: CL101 Oklahoma Certification #: 9507 Oregon Certification #: MN200001 Oregon Certification #: MN300001 Pennsylvania Certification #: 68-00563

Puerto Rico Certification Saipan (CNMI) #:MP0003 South Carolina #:74003001 Texas Certification #: T104704192 Tennessee Certification #: 02818 Utah Certification #: MN000642013-4 Virginia DGS Certification #: 251 Virginia/VELAP Certification #: Pace Washington Certification #: C486 West Virginia Certification #: 382 West Virginia DHHR #:9952C Wisconsin Certification #: 999407970



SAMPLE SUMMARY

Project: WEST LAKE LANDFILL

Pace Project No.: 60190027

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60190027001	WAA-01-RV-PS-20150313	Air	03/13/15 09:25	03/18/15 09:30
60190027002	WAA-02-RV-PS-20150313	Air	03/13/15 09:32	03/18/15 09:30
60190027003	WAA-03-RV-PS-20150313	Air	03/13/15 09:54	03/18/15 09:30
60190027004	WAA-04-RV-PS-20150313	Air	03/13/15 10:06	03/18/15 09:30
60190027005	WAA-05-RV-PS-20150313	Air	03/13/15 09:44	03/18/15 09:30
60190027006	WAA-04-RV-DU-20150313	Air	03/13/15 10:06	03/18/15 09:30
60190027007	WAA-00-RV-TB-20150313	Air	03/13/15 10:30	03/18/15 09:30

(913)599-5665



SAMPLE ANALYTE COUNT

Project: WEST LAKE LANDFILL

Pace Project No.: 60190027

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60190027001	WAA-01-RV-PS-20150313	TO-17M	RTP	13	PASI-M
60190027002	WAA-02-RV-PS-20150313	TO-17M	RTP	13	PASI-M
60190027003	WAA-03-RV-PS-20150313	TO-17M	RTP	13	PASI-M
60190027004	WAA-04-RV-PS-20150313	TO-17M	RTP	13	PASI-M
60190027005	WAA-05-RV-PS-20150313	TO-17M	RTP	13	PASI-M
60190027006	WAA-04-RV-DU-20150313	TO-17M	RTP	13	PASI-M
60190027007	WAA-00-RV-TB-20150313	TO-17M	RTP	13	PASI-M



Project:

WEST LAKE LANDFILL

Pace Project No.: 60190027

Sample: WAA-01-RV-PS-20150313	Lab ID: 601	90027001	Collected: 03/13/	15 09:25	Received: 03	/18/15 09:30 N	/latrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qua
TO17M VOC MS AIR Passive	Analytical Meth	nod: TO-17N	Preparation Metho	d: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:15	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:15	156-60-5	
Ethylbenzene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:15	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 14:15	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:15	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 14:15	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 14:15	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 14:15	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 14:15	108-67-8	
Vinyl chloride	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:15	75-01-4	
n&p-Xylene	ND	ug/m3	0.82	4.21	03/24/15 08:11	03/24/15 14:15	179601-23-1	
o-Xylene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:15	95-47-6	
Surrogates								
Chlorobenzene-d5 (S)	110	%.	70-130	4.21	03/24/15 08:11	03/24/15 14:15	3114-55-4	

HV6 9 April 2015



Project:

WEST LAKE LANDFILL

Pace Project No.:

Date: 03/27/2015 09:54 AM

60190027

Sample: WAA-02-RV-PS-20150313	Lab ID: 601	90027002	Collected: 03/13/1	15 09:32	Received: 03	3/18/15 09:30 N	// Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Met	hod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:46	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:46	156-60-5	
Ethylbenzene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:46	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 14:46	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:46	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 14:46	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 14:46	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 14:46	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 14:46	108-67-8	
Vinyl chloride	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:46	75-01-4	
m&p-Xylene	ND	ug/m3	0.83	4.21	03/24/15 08:11	03/24/15 14:46	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 14:46	95-47-6	
Chiorobenzene-d5 (S)	97	%.	70-130	4.21	03/24/15 08:11	03/24/15 14:46	3114-55-4	

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Project:

WEST LAKE LANDFILL

Pace Project No.: 60190027

Sample: WAA-03-RV-PS-20150313	Lab ID: 601	90027003	Collected: 03/13/1	5 09:54	Received: 03	/18/15 09:30 N	latrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meth	nod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:17	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:17	156-60-5	
Ethylbenzene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:17	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 15:17	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:17	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 15:17	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 15:17	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 15:17	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 15:17	108-67-8	
Vinyl chloride	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:17	75-01-4	
m&p-Xylene	ND	ug/m3	0.83	4.21	03/24/15 08:11	03/24/15 15:17	179601-23-1	
o-Xylene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:17	95-47-6	
Surrogates								
Chlorobenzene-d5 (S)	99	%.	70-130	4.21	03/24/15 08:11	03/24/15 15:17	3114-55-4	

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Project:

WEST LAKE LANDFILL

Pace Project No.:

Date: 03/27/2015 09:54 AM

60190027

Sample: WAA-04-RV-PS-20150313	Lab ID: 60°	190027004	Collected: 03/13/	15 10:06	Received: 03	3/18/15 09:30 M	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Met	thod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:48	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:48	156-60-5	
Ethylbenzene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:48	100-41-4	
Isopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 15:48	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:48	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 15:48	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 15:48	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 15:48	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 15:48	108-67-8	
Vinyl chloride	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:48	75-01-4	
m&p-Xylene	0.94	ug/m3	0.82	4.21	03/24/15 08:11	03/24/15 15:48	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 15:48	95-47-6	
Chlorobenzene-d5 (S)	102	%.	70-130	4.21	03/24/15 08:11	03/24/15 15:48	3114-55-4	

HUE 9 Apr 15



Project:

WEST LAKE LANDFILL

Pace Project No.:

Date: 03/27/2015 09:54 AM

60190027

Sample: WAA-05-RV-PS-20150313	Lab ID: 601	90027005	Collected: 03/13/1	5 09:44	Received: 03	/18/15 09:30 N	fatrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meti	nod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:19	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:19	156-60-5	
Ethylbenzene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:19	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 16:19	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:19	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 16:19	127-18-4	
richloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 16:19	79-01-6	
,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 16:19	95-63-6	
,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 16:19	108-67-8	
/inyl chloride	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:19	75-01-4	
n&p-Xylene	0.87	ug/m3	0.83	4.21	03/24/15 08:11	03/24/15 16:19	179601-23-1	
o-Xylene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:19	95-47-6	
S <i>urrogates</i> Chlorobenzene-d5 (S)	104	%.	70-130	4.21	03/24/15 08:11	03/24/15 16:19	3114-55-4	





Project:

WEST LAKE LANDFILL

Pace Project No.:

60190027

ample: WAA-04-RV-DU-20150313	Lab ID: 601	90027006	Collected: 03/13/1	15 10:06	Received: 03	/18/15 09:30 N	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
O17M VOC MS AIR Passive	Analytical Meth	nod: TO-17M	Preparation Metho	od: TO-1	7M			
is-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:50	156-59-2	
ans-1,2-Dichloroethene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:50	156-60-5	
thylbenzene	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:50	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 16:50	98-82-8	
lethyl-tert-butyl ether	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:50	1634-04-4	
etrachloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 16:50	127-18-4	
richloroethene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 16:50	79-01-6	
,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 16:50	95-63-6	
,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	03/24/15 08:11	03/24/15 16:50	108-67-8	
'inyl chloride	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:50	75-01-4	
n&p-Xylene	0.87	ug/m3	0.82	4.21	03/24/15 08:11	03/24/15 16:50	179601-23-1	
-Xylene Surrogates	ND	ug/m3	0.41	4.21	03/24/15 08:11	03/24/15 16:50	95-47-6	
Chlorobenzene-d5 (S)	106	%.	70-130	4.21	03/24/15 08:11	03/24/15 16:50	3114-55-4	

AUE 9 Am 15



Project:

WEST LAKE LANDFILL

Pace Project No.:

60190027

Sample: WAA-00-RV-TB-20150313	Lab ID: 601	90027007	Collected: 03/13/1	5 10:30	Received: 03	3/18/15 09:30 I	Matrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Met	hod: TO-17M	Preparation Metho	d: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.098	1	03/24/15 08:11	03/24/15 13:43	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.098	1	03/24/15 08:11	03/24/15 13:43	156-60-5	
Ethylbenzene	ND	ug/m3	0.098	1	03/24/15 08:11	03/24/15 13:43	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	0.25	1	03/24/15 08:11	03/24/15 13:43	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.098	1	03/24/15 08:11	03/24/15 13:43	1634-04-4	
Tetrachloroethene	ND	ug/m3	0.25	1	03/24/15 08:11	03/24/15 13:43	127-18-4	
Trichloroethene	ND	ug/m3	0.25	1	03/24/15 08:11	03/24/15 13:43	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	0.25	1	03/24/15 08:11	03/24/15 13:43	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	0.25	1	03/24/15 08:11	03/24/15 13:43	108-67-8	
/inyl chloride	ND	ug/m3	0.098	1	03/24/15 08:11	03/24/15 13:43	75-01-4	
n&p-Xylene	ND	ug/m3	0.20	1	03/24/15 08:11	03/24/15 13:43	179601-23-1	
o-Xylene Surrogates	ND	ug/m3	0.098	1	03/24/15 08:11	03/24/15 13:43	95-47-6	
Chlorobenzene-d5 (S)	107	%.	70-130	1	03/24/15 08:11	03/24/15 13:43	3114-55-4	





QUALITY CONTROL DATA

Project: WEST LAKE LANDFILL

Pace Project No.: 60190027

Date: 03/27/2015 09:54 AM

QC Batch: AIR/22817 Analysis Method: TO-17M
QC Batch Method: TO-17M Analysis Description: TO17 MSS AIR

Associated Lab Samples: 60190027001, 60190027002, 60190027003, 60190027004, 60190027005, 60190027006, 60190027007

METHOD BLANK: 1923911 Matrix: Air

Associated Lab Samples: 60190027001, 60190027002, 60190027003, 60190027004, 60190027005, 60190027006, 60190027007

		Blank	Reporting		
Parameter	Units	Result	Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	ND	0.25	03/24/15 09:32	
1,3,5-Trimethylbenzene	ug/m3	ND	0.25	03/24/15 09:32	
cis-1,2-Dichloroethene	ug/m3	ND	0.098	03/24/15 09:32	
Ethylbenzene	ug/m3	ND	0.098	03/24/15 09:32	
Isopropylbenzene (Cumene)	ug/m3	ND	0.25	03/24/15 09:32	
m&p-Xylene	ug/m3	ND	0.20	03/24/15 09:32	
Methyl-tert-butyl ether	ug/m3	ND	0.098	03/24/15 09:32	
o-Xylene	ug/m3	ND	0.098	03/24/15 09:32	
Tetrachloroethene	ug/m3	ND	0.25	03/24/15 09:32	
trans-1,2-Dichloroethene	ug/m3	ND	0.098	03/24/15 09:32	
Trichloroethene	ug/m3	ND	0.25	03/24/15 09:32	
Vinyl chloride	ug/m3	ND	0.098	03/24/15 09:32	
Chlorobenzene-d5 (S)	%.	95	70-130	03/24/15 09:32	

LABORATORY CONTROL SAMPLE:	1923912					
		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	.16		107	72-137	
1,3,5-Trimethylbenzene	ug/m3	.16	.16J	101	73-134	
cis-1,2-Dichloroethene	ug/m3	.11	0.13	125	70-139	
Ethylbenzene	ug/m3	.12	0.13	112	63-140	
Isopropylbenzene (Cumene)	ug/m3	.13	.14J	109	75-135	
m&p-Xylene	ug/m3	.23	0.25	111	65-137	
Methyl-tert-butyl ether	ug/m3	.083	.093J	112	41-150	
o-Xylene	ug/m3	.12	0.13	105	64-139	
Tetrachloroethene	ug/m3	.18	.23J	127	64-141	
trans-1,2-Dichloroethene	ug/m3	.11	0.13	125	70-130	
Trichloroethene	ug/m3	.14	.15J	112	73-136	
Vinyl chloride	ug/m3	.068	.091J	134	59-150 C	Н
Chlorobenzene-d5 (S)	%.			96	70-130	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.



QUALIFIERS

Project: WEST LAKE LANDFILL

Pace Project No.: 60190027

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

ANALYTE QUALIFIERS

Date: 03/27/2015 09:54 AM

CH The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.



QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: WEST LAKE LANDFILL

Pace Project No.: 60190027

Date: 03/27/2015 09:54 AM

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60190027001	WAA-01-RV-PS-20150313	TO-17M	AIR/22817	TO-17M	AIR/22818
60190027002	WAA-02-RV-PS-20150313	TO-17M	AIR/22817	TO-17M	AIR/22818
60190027003	WAA-03-RV-PS-20150313	TO-17M	AIR/22817	TO-17M	AIR/22818
60190027004	WAA-04-RV-PS-20150313	TO-17M	AIR/22817	TO-17M	AIR/22818
60190027005	WAA-05-RV-PS-20150313	TO-17M	AIR/22817	TO-17M	AIR/22818
60190027006	WAA-04-RV-DU-20150313	TO-17M	AIR/22817	TO-17M	AIR/22818
60190027007	WAA-00-RV-TB-20150313	TO-17M	AIR/22817	TO-17M	AIR/22818

Document Name: Air Sample Condition Upon Receipt

Document No.:

Document Revised: 26Dec2013 Page 1 of 1

110	ic o r inaryticai		F-MN-A-1			Pace Minnesota Qua						
Air Sample Condition C Upon Receipt	client Name: foth tach	/pice	k5	Project #	WC	#:6019	0027					
Courler:	Fed Ex □UPS Commercial □Pace 7314673.327	□USPS □Other:		lient	6019	90027						
Custody Seal on Cooler/	\	□No	Seals In	itact?	Jyes □No	Optional: Proj. Due Date	: Proj. Name:					
Packing Material: Bu		Bags Foar	n 🔲 Ne	one [Other:		mp Blank rec: 🏹 Yes 🗌 No					
Temp. (TO17 and TO13 sam)	ples only) (°C): 5.8	Corrected Tem	p (°C):	5:8	Thermom. Used:	☐B88A912167504 '☐B88A9132521491	☐ 72337080 ☐ 80512447					
Temp should be above free: Type of ice Received B	zing to 6°C Correction Fac lue \textstywet \textsty None	tor:			Date & Initials of	Serial B88A9132521491 Person Examining Contents	:					
18 (10 CS) (10 - 20 (10 c) (1)				_	V	Comments:						
Chain of Custody Present		Yes	□No	□n/A	1.							
Chain of Custody Filled O		√QYes	□No	□n/a	2.							
Chain of Custody Relinqu		Yes	No	□n/a	3,							
Sampler Name and/or Sig		Yes	□No	□n/a	4.	· · · · · · · · · · · · · · · · · · ·						
Samples Arrived within H	777	`_Yes	□No	□N/A	5.							
Short Hold Time Analysis		□Yes	No	□N/A	6.							
Rush Turn Around Time I	Requested?	Yes	No	□N/A	7.		more than the same of the same					
Sufficient Volume?		∑Yes	No	□N/A	8.							
Correct Containers Used?		Yes	□No	□N/A	9,							
-Pace Containers Used	?	Yes	□No	□N/A	7							
Containers Intact?	4:10	Yes	□No	□N/A	10.							
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	300	_	pane.	res (11.							
Sample Labels Match COC	J?	Yes	No	□N/A	12.							
Samples Received:												
Cani	sters		Flow	Controllers		Stand Alone G						
Sample Number	Can ID	Sample N	lumber		Can ID	Sample Number	Can ID					
V												
							2.4					
300	The state of the s											
							h					
CLIENT NOTIFICATION/RE Person Conta				[Date/Time:	Field Data Require						
Person Contacted: Date/Time: Comments/Resolution:												
		0										
Project Manager Review:	COL				Date:	3.15.1	لي					

Note: Whenever there is a discrepancy affecting Notti Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)



CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Section B Required Client Information: Required Project Inform								Section C Invoice Information:									Page:	1	of	1	
Company: Tetra Tech EMI Report To: Emily Fisher							Atte	Attention: Emily Fisher													
Address: 415 Oak Copy To:						100000000000000000000000000000000000000	Con	npany Nar	ne: Tetra Tech				REGU	LATOR	Y AGE	NCY			11.		
Kansas City, MO 64106								Address: 415 Oak St, Kansas City, MO 64106					I N	PDES	□ GR	OUND	WATE	R F	DRINKING	WATER	
Email To: Emily.Fisher@tetratech.com Purchase Order No.: 1111499								Pace Quote Reference:						FUST FRCRA FOTHER							
Phone:	(816) 412-1755 Fax:	Project Name	: W	est Lake Li	andfill			Pace	Pace Project Sherri Rosenstangle						Site Location						
Reques	equested Due Date/TAT: Project Number:								Manager: Pace Profile # 970.8					STATE: M		MO	10				
	SHE					-				777 1 - 811	165	F	lequested	1500		ed (Y/N	YS.	VIII			
	Section D Valid Matrix	Codes	e 6	1					l m		킇	Γ		TT	1		T	- ////			
	Required Client Information MATRIX DRINKING WATER	Codes (2) (a) (a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c			ECTED			E E		TN/A											
	WATER WASTE WASTE WASTE WASTE WASTE WASTE PRODUCT SOLUSOLID OIL SAMPLE ID WIPE AR	AA	(See valid of		IG END TIME	SAMPLING DATE/I	3 END IME	JG TIME (MINUTES)	PLING TEMPERA	AVERAGE SAMPLING TEMPERATURE (°C) NOTE OF THE SAMPLING TEMPERATURE (°C) NOTE OF THE SAMPLING TEMPERATURE (°C)		A.						orine (Y/N)		201	27
ITEM #	(A-Z, 0-9 / ,-) OTHER Sample IDs MUST BE UNIQUE TISSUE	TS	MATRIX CODE SAMPLE TYPE	DATE	TIME	DATE	TIME	TOTAL SAMPLING TIME	AVERAGE SAMF			TO-17 Passive						Residual Chlorine (Y/N)		1900	lo./ Lab I.D.
1	WAA-01-RV-PS-20150313		AR	3/6/15	14:06	3/13/15	09:25	9799	9.4	163CY		х									
2	WAA-02-RV-PS-20150313		AR	3/6/15	14:20	3/13/15	09:32	9792	9.4	164CY		x									
3	WAA-03-RV-PS-20150313		AR	3/6/15	14:44	3/13/15	09:54	9790	9.4	166CY	10	x						\perp			
4	WAA-04-RV-PS-20150313		AR	3/6/15	13:52	3/13/15	10:06	9854	9.4	187CY		x						\perp			
5	WAA-05-RV-PS-20150313		AR	3/6/15	14:31	3/13/15	09:44	9793	9.4	796BN	14	х						\perp			
6	WAA-04-RV-DU-20150313		AR	3/6/15	13:52	3/13/15	10:06	9854	9.4	797BN	1	X						\perp			
7	WAA-00-RV-TB-20150313		AR	3/6/15	13:52	3/13/15	10:30	NA	NA	799BN	I.	x						\perp	- 1		
8											200	_					\perp	+			
9			_									L		\vdash			\vdash	+			
10			_	-				-				⊢		+	\vdash	-	-	+			
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12	I CONTROLL CALLED TO	714.52		Walter DV	A	011	DATE	Sh No.	TIME	ACCEPTE	DOV	LAFT	U VATION	Madan	DATE	TIME			CAMP	LE CONDIT	ONS
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				-	SAMPLI	ER NAME A	ND SIGNAT	URE	100	1.00	111	N.C	917,165	3300		4125	200	o o	ш (oler	itact
					The state of the	PRINT Nam	e of SAMPL	R: T	imo	hy Barbe	av	1	10-13	11/17	4 4	44 - 1 - 2 - 2		Temp in •	N/N)	stody d Cor	les in
						SIGNATUR	E of SAMPL		wen	10 0			ATE Signed IM/DD/YY):	3/17	/15			Tem	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	Pace Analytical Services, Inc. (Lenexa, Kansas)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 16, 2015
Sample Delivery Group (SDG):	60191132
Sample Numbers:	WAA-04-RV-PS-20150327, WAA-04-RV-DU-20150327, and WAA-04-RV-TB-20150327
Matrix / Number of Samples:	1 Air Sample, 1 Field Duplicate Sample, and 1 Trip Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pathat were found, and data qualification.	ratory Program National Functional Guidelines for Superfund Organic June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data
•	alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Elli	ال ما 16 April 2015
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) 60191132 included one (1) environmental air (adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for selected volatile organic compounds via EPA Air Method TO-17. The following summarizes the data validation that was performed.

VOLATILE ORGANIC COMPOUND ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) blank or the field (trip) blank. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All LCS results were within QC limits. No qualifications were applied.

V. Surrogates

Due to laboratory error, two field samples were not spiked with the surrogate. All other surrogate recoveries (including those in previous SDG) were within QC limits. No qualifications were applied.

VI. Comments

No analytes were detected in the field samples.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.





April 08, 2015

Emily Fisher TETRA TECH EMI 415 Oak Kansas City, MO 64106

RE: Project: WEST LAKE LANDFILL Pace Project No.: 60191132

Dear Emily Fisher:

Enclosed are the analytical results for sample(s) received by the laboratory on April 01, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Emily Webb for Sherri Rosenstangle sherri.rosenstangle@pacelabs.com Project Manager

Enclosures



9608 Loiret Blvd. Lenexa, KS 66219 (913)599-5665



CERTIFICATIONS

Project: WEST LAKE LANDFILL

60191132 Pace Project No.:

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414

A2LA Certification #: 2926.01 Alaska Certification #: UST-078 Alaska Certification #MN00064 Alabama Certification #40770 Arizona Certification #: AZ-0014 Arkansas Certification #: 88-0680 California Certification #: 01155CA Colorado Certification #Pace Connecticut Certification #: PH-0256

EPA Region 8 Certification #: 8TMS-L Florida/NELAP Certification #: E87605

Guam Certification #:14-008r Georgia Certification #: 959 Georgia EPD #: Pace

Idaho Certification #: MN00064 Hawaii Certification #MN00064 Illinois Certification #: 200011 Indiana Certification#C-MN-01 Iowa Certification #: 368

Kansas Certification #: E-10167 Kentucky Dept of Envi. Protection - DW #90062 Kentucky Dept of Envi. Protection - WW #:90062

Louisiana DEQ Certification #: 3086 Louisiana DHH #: LA140001 Maine Certification #: 2013011 Maryland Certification #: 322 Michigan DEPH Certification #: 9909 Minnesota Certification #: 027-053-137 Mississippi Certification #: Pace Montana Certification #: MT0092 Nevada Certification #: MN_00064 Nebraska Certification #: Pace New Jersey Certification #: MN-002 New York Certification #: 11647

North Carolina Certification #: 530 North Carolina State Public Health #: 27700

North Dakota Certification #: R-036

Ohio EPA #: 4150 Ohio VAP Certification #: CL101 Oklahoma Certification #: 9507 Oregon Certification #: MN200001 Oregon Certification #: MN300001 Pennsylvania Certification #: 68-00563

Puerto Rico Certification Saipan (CNMI) #:MP0003 South Carolina #:74003001 Texas Certification #: T104704192 Tennessee Certification #: 02818 Utah Certification #: MN000642013-4 Virginia DGS Certification #: 251 Virginia/VELAP Certification #: Pace Washington Certification #: C486 West Virginia Certification #: 382 West Virginia DHHR #:9952C

Wisconsin Certification #: 999407970

(913)599-5665



SAMPLE SUMMARY

Project: WEST LAKE LANDFILL

Pace Project No.: 60191132

Lab ID	Sample ID	Matrix	Date Collected	Date Received	
60191132001	WAA-04-RV-PS-20150327	Air	03/27/15 09:36	04/01/15 10:10	
60191132002	WAA-04-RV-DU-20150327	Air	03/27/15 09:36	04/01/15 10:10	
60191132003	WAA-04-RV-TB-20150327	Air	03/27/15 09:55	04/01/15 10:10	

REPORT OF LABORATORY ANALYSIS



Lenexa, KS 66219 (913)599-5665

SAMPLE ANALYTE COUNT

Project: WEST LAKE LANDFILL

Pace Project No.: 60191132

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60191132001	WAA-04-RV-PS-20150327	TO-17M	RTP	13	PASI-M
60191132002	WAA-04-RV-DU-20150327	TO-17M	RTP	13	PASI-M
60191132003	WAA-04-RV-TB-20150327	TO-17M	RTP	13	PASI-M

REPORT OF LABORATORY ANALYSIS



ANALYTICAL RESULTS

Project:

WEST LAKE LANDFILL

Pace Project No.:

60191132

Sample: WAA-04-RV-PS-20150327	Lab ID: 601	91132001	Collected: 03/27/	15 09:36	Received: 04	/01/15 10:10 N	//atrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qua
TO17M VOC MS AIR Passive	Analytical Met	hod: TO-17N	/ Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:04	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:04	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:04	100-41-4	
Isopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	04/02/15 08:51	04/02/15 14:04	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:04	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	04/02/15 08:51	04/02/15 14:04	127-18-4	
Trichloroethene	ND	ug/m3	1.0	4.21	04/02/15 08:51	04/02/15 14:04	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	04/02/15 08:51	04/02/15 14:04	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	04/02/15 08:51	04/02/15 14:04	108-67-8	
Vinyl chloride	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:04	75-01-4	
m&p-Xylene	ND	ug/m3	0.80	4.21	04/02/15 08:51	04/02/15 14:04	179601-23-1	
o-Xylene	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:04	95-47-6	
Surrogates								
Chlorobenzene-d5 (S)	0	%.	70-130	4.21	04/02/15 08:51	04/02/15 14:04	3114-55-4	1e)

unspiled -

HUG 16 April 2015



ANALYTICAL RESULTS

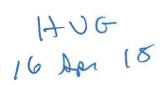
Project:

WEST LAKE LANDFILL

Pace Project No.:

60191132

Sample: WAA-04-RV-DU-20150327	Lab ID: 60	191132002	Collected: 03/27/	15 09:36	Received: 04	/01/15 10:10 N	//atrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
O17M VOC MS AIR Passive	Analytical Me	thod: TO-17M	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:37	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:37	156-60-5	
Ethylbenzene	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:37	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	1.0	4.21	04/02/15 08:51	04/02/15 14:37	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:37	1634-04-4	
Tetrachloroethene	ND	ug/m3	1.0	4.21	04/02/15 08:51	04/02/15 14:37	127-18-4	
richloroethene richloroethene	ND	ug/m3	1.0	4.21	04/02/15 08:51	04/02/15 14:37	79-01-6	
,2,4-Trimethylbenzene	ND	ug/m3	1.0	4.21	04/02/15 08:51	04/02/15 14:37	95-63-6	
,3,5-Trimethylbenzene	ND	ug/m3	1.0	4.21	04/02/15 08:51	04/02/15 14:37	108-67-8	
/inyl chloride	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:37	75-01-4	
n&p-Xylene	ND	ug/m3	0.80	4.21	04/02/15 08:51	04/02/15 14:37	179601-23-1	
o-Xylene	ND	ug/m3	0.40	4.21	04/02/15 08:51	04/02/15 14:37	95-47-6	
Surrogates								0
Chlorobenzene-d5 (S)	0	%.	70-130	4.21	04/02/15 08:51	04/02/15 14:37	3114-55-4	(1e)



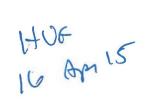


ANALYTICAL RESULTS

Project: WEST LAKE LANDFILL

Pace Project No.: 60191132

Sample: WAA-04-RV-TB-20150327	Lab ID: 60°	191132003	Collected: 03/27/	5 09:55	Received: 04	/01/15 10:10 N	//atrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Met	thod: TO-17N	Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.096	1	04/02/15 08:51	04/02/15 13 16	156-59-2	
rans-1,2-Dichloroethene	ND	ug/m3	0.096	1	04/02/15 08:51	04/02/15 13:16	156-60-5	
Ethylbenzene	ND	ug/m3	0.096	1	04/02/15 08:51	04/02/15 13:16	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	0.24	1	04/02/15 08:51	04/02/15 13:16	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.096	1	04/02/15 08:51	04/02/15 13:16	1634-04-4	
Tetrachloroethene	ND	ug/m3	0.24	1	04/02/15 08:51	04/02/15 13:16	127-18-4	
Trichloroethene	ND	ug/m3	0.24	1	04/02/15 08:51	04/02/15 13:16	79-01-6	
1,2,4-Trimethylbenzene	ND	ug/m3	0.24	1	04/02/15 08:51	04/02/15 13:16	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	0.24	1	04/02/15 08:51	04/02/15 13:16	108-67-8	
/inyl chloride	ND	ug/m3	0.096	1	04/02/15 08:51	04/02/15 13:16	75-01-4	
m&p-Xylene	ND	ug/m3	0.19	1	04/02/15 08:51	04/02/15 13:16	179601-23-1	
o-Xylene	ND	ug/m3	0.096	1	04/02/15 08:51	04/02/15 13:16	95-47-6	
Surrogates Chlorobenzene-d5 (S)	123	%.	70-130	1	04/02/15 08:51	04/02/15 13:16	3114-55-4	





QUALITY CONTROL DATA

Project: WEST LAKE LANDFILL

Pace Project No.: 60191132

Date: 04/08/2015 03:57 PM

QC Batch: AIR/22935 Analysis Method: TO-17M
QC Batch Method: TO-17M Analysis Description: TO17 MSS AIR

Associated Lab Samples: 60191132001, 60191132002, 60191132003

METHOD BLANK: 1933021 Matrix: Air

Associated Lab Samples: 60191132001, 60191132002, 60191132003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	ND .	0.24	04/02/15 10:59	
1,3,5-Trimethylbenzene	ug/m3	ND	0.24	04/02/15 10:59	
cis-1,2-Dichloroethene	ug/m3	ND	0.096	04/02/15 10:59	
Ethylbenzene	ug/m3	ND	0.096	04/02/15 10:59	
Isopropylbenzene (Cumene)	ug/m3	ND	0.24	04/02/15 10:59	
m&p-Xylene	ug/m3	ND	0.19	04/02/15 10:59	
Methyl-tert-butyl ether	ug/m3	ND	0.096	04/02/15 10:59	
o-Xylene	ug/m3	ND	0.096	04/02/15 10:59	
Tetrachloroethene	ug/m3	ND	0.24	04/02/15 10:59	
trans-1,2-Dichloroethene	ug/m3	ND	0.096	04/02/15 10:59	
Trichloroethene	ug/m3	ND	0.24	04/02/15 10:59	
Vinyl chloride	ug/m3	ND	0.096	04/02/15 10:59	
Chlorobenzene-d5 (S)	%.	116	70-130	04/02/15 10:59	

LABORATORY CONTROL SAMPLE:	1933022					
		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	.15	.12J	75	72-137	
1,3,5-Trimethylbenzene	ug/m3	.15	.11J	74	73-134	
cis-1,2-Dichloroethene	ug/m3	.1	0.11	109	70-139	
Ethylbenzene	ug/m3	.12	.088J	76	63-140	
Isopropylbenzene (Cumene)	ug/m3	.13	.1J	78	75-135	
m&p-Xylene	ug/m3	.22	.17J	76	65-137	
Methyl-tert-butyl ether	ug/m3	.083	.073J	89	41-150	
o-Xylene	ug/m3	.12	.094J	78	64-139	
Tetrachloroethene	ug/m3	.18	.19J	104	64-141	
trans-1,2-Dichloroethene	ug/m3	.1	0.12	111	70-130	
Trichloroethene	ug/m3	.14	.13J	99	73-136	
Vinyl chloride	ug/m3	.067	.074J	110	59-150	
Chlorobenzene-d5 (S)	%.			118	70-130	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS



QUALIFIERS

Project: WEST LAKE LANDFILL

Pace Project No.: 60191132

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

ANALYTE QUALIFIERS

Date: 04/08/2015 03:57 PM

1e Surrogate standard was not added to this sample tube due to instrument error. The addition of a surrogate standard is not required per the TO17 method.

REPORT OF LABORATORY ANALYSIS

(913)599-5665



QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: WEST LAKE LANDFILL

Pace Project No.: 60191132

Date: 04/08/2015 03:57 PM

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60191132001	WAA-04-RV-PS-20150327	TO-17M	AIR/22935	TO-17M	AIR/22938
60191132002	WAA-04-RV-DU-20150327	TO-17M	AIR/22935	TO-17M	AIR/22938
60191132003	WAA-04-RV-TB-20150327	TO-17M	AIR/22935	TO-17M	AIR/22938

Pace Analytical*

hold, incorrect preservative, out of temp, incorrect containers)

Document Name: Air Sample Condition Upon Receipt Document No.:

Document Revised: 26Dec2013 Page 1 of 1 Issuing Authority:

F-MN-A-106-rev.09 Pace Minnesota Quality Office Air Sample Condition Client Name: Project #: WO#:60191132 **Upon Receipt** Tetrateur EMI Courier: Fed Ex USPS Client Pace Commercial Other: 773256165091 Tracking Number: Proj. Due Date: Proj. Name: Custody Seal on Cooler/Box Present? Yes **Z**Yes No Seals Intact? Packing Material: Bubble Wrap Bubble Bags Foam None Other: Temp Blank rec: Yes No 72337080 B88A912167504 Temp. (TO17 and TO13 samples only) (°C): Corrected Temp (°C): Thermom. Used: B88A9132521491 80512447 Date & Initials of Person Examining Contents: Temp should be above freezing to 6°C Correction Factor: +0,2 Type of ice Received Blue Wet Inone Comments: Chain of Custody Present? Yes No □N/A 1. **V**Yes Chain of Custody Filled Out? □No □N/A 2. Chain of Custody Relinquished? 3. □No □N/A Sampler Name and/or Signature on COC? Yes □No □N/A 4. Samples Arrived within Hold Time? Yes □No □N/A 5. Short Hold Time Analysis (<72 hr)? □N/A 6. Yes No ZNO Rush Turn Around Time Requested? Yes □N/A 7. Sufficient Volume? □No □N/A Zyes 8. Yes Correct Containers Used? No □N/A 9. -Pace Containers Used? □N/A Yes Containers Intact? □N/A 10. TU585 11. Sample Labels Match COC? Yes □No □N/A 12. Samples Received: Canisters Flow Controllers Stand Alone G Sample Number Can ID Sample Number Can ID Sample Number CLIENT NOTIFICATION/RESOLUTION Field Data Required? Yes No Person Contacted: Comments/Resolution:

Project Manager Review: Date: Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of



CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

_	d Client Information:	Section B Required P		ormation:					Section C Invoice Information:								Page:	1	of	1	
Compar	y: Tetra Tech EMI	Report To:	Emily F	isher				Atte	ntion:	Emily Fisher											
Address	415 Oak	Copy To:						Соп	Company Name: Tetra Tech					REGULATORY AGENCY							
	Kansas City, MO 64106					-		Add	ress:	415 Oak St, Kansa	s Cit	y, MC	64106	FN	PDES	T G	ROUN	D WATE	R	DRINKING	WATER
Email To	: Emily Fisher@tetratech.com	Purchase 0	order No.:	1111499)			Page	Quota rance:					1 - 0	ST	□ R	CRA		г	OTHER	
Phone:	(816) 412-1755 Fax:	Project Nam	ne: W	est Lake La	andfill			Page	Project	Sherri Rosenstangl	8	-		Site	ocation	1	_				
Reques	ted Due Date/TAT:	Project Nun	nber:			-		Mana Pace		970.8					STATE:		MO				
							-				136	R	equeste	- 5000	43.1011	1	N)	VIII			
	Section D Valid Matrix C Required Client Information MATRIX	odes CODE	o left)		COLL	ECTED		· · ·	URE		TNIX	-		TŤ	П	TT	T				
ITEM#	DAINGING WATER WATER WASTE WAS	DW WT WW P SL OL WIP AR OT TS	MATRIX CODE (see valid codes to left) SAMPLE TYPE (G-GRAB C=COMP)	DATE	IG END TIME	SAMPLINI DATE/I	S. END IME	TOTAL SAMPLING TIME (MINUTES)	AVERAGE SAMPLING TEMPERATURE (°C)	TUBE SERIAL NUMBER	Analysis Test	sive						Residual Chlorine (Y/N)	100		(3)2
1	0 <		AR	3/20/15	00:00	3/27/15	00:00	0	0.0	0		x					\Box	\Box			
2	0		AR	1/0/00	00:00	1/0/00	00:00	0	0.0	0	1	x									
3:	0		AR	1/0/00	00:00	1/0/00	00:00	0	0.0	0	1	X									
4	WAA-04-RV-PS-20150327		AR	3/20/15	10:10	3/27/15	09:36	10046	9.4	169CY		X									
5	0		AR	1/0/00	00:00	1/0/00	00:00	0	0.0	0		X									25.17 S.37
6	WAA-04-RV-DU-20150327		AR	3/20/15	10:10	3/27/15	09:36	10046	9.4	170CY		x									
7	WAA-00-RV-TB-20150327	1	AR	3/20/15	09:20	3/27/15	09:55	NA	NA	171CY		x					11		7 7 7 23		
8																					
9												Ц									
10				ļ.,							1.	Ц	\perp	$\perp \perp$				\perp			
11											3.	Н	\perp	$\perp \perp$			1	\perp			
12	Contract of the Contract of th							-				Ц			11	H	1	\perp			
-	ADDITIONAL COMMENTS			JISHED BY /	1	1000	DATE	· Peage	TIME	ACCEPTE	DBY	/ AFF	LIATION		DATE	TIE	-		SAME	LE CONDITI	ONS
		Ting	h 6	nlæa	Tietre	a Tech	3/31/1	5 11	100	13:STA	Ţ	9010	Ø	147	1/15	01	U !	5.3	À	7	¥
					SAMPLE	R NAME A	ND SIGNAT	URE				at live	71.2	#11/12	******		in Ta	Q	Lio (oler.	itact
סַ						PRINT Nam	e of SAMPLI	R: 1	imot	thy Barber	an	et in a decide			20-14-			Temp In °C	Wed	d Co	les In
Page 1						SIGNATUR	E of SAMPLI			+ Borreso		DA (M	TE Signed	3/	31/1	Ş		Tem	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	ALS Environmental (Simi Valley, California)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 17, 2015
Sample Delivery Group (SDG):	P1500832
Sample Numbers:	WAA-01-RH-PS-20150227, WAA-02-RH-PS-20150227, WAA-03-RH-PS-20150227, WAA-04-RH-PS-20150227, WAA-04-RH-DU-20150227, WAA-05-RH-PS-20150227, and WAA-00-RH-TB-20150227
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pacthat were found, and data qualifications.	atory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ons applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data
I, Harry Ellis, certify that all data va	didation criteria outlined in the above-referenced documents were to the data accorded with those documents.
Hang N. Elli	17 April 2015
Certified by Harry Ellis, Chemist	Date

 $103I9025140058.000 \hspace{35pt} 1 \hspace{35pt} \text{SDG P1500832}$

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) P1500832 included five (5) environmental air (RadielloTM adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for hydrogen sulfide via the laboratory's implementation of the manufacturer's method. The following summarizes the data validation that was performed.

HYDROGEN SULFIDE ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the accepted holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) and field blanks. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All results for the duplicate LCS were within QC limits.

V. Surrogates

Surrogates are not used in this analysis.

VI. Comments

No analyte was detected.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.

103I9025140058.000 3 SDG P1500832

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2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

LABORATORY REPORT

March 25, 2015

Rob Monnig Tetra Tech, Incorporated 415 Oak Street Kansas City, MO 64106

RE: West Lake Landfill / 103X9025140058

Dear Rob:

Enclosed are the results of the samples submitted to our laboratory on March 4, 2015. For your reference, these analyses have been assigned our service request number P1500832.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Sue Anderson

Project Manager



2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

Service Request No:

P1500832

Client: Tetra Tech, Incorporated

Project: West Lake Landfill / 103X9025140058

CASE NARRATIVE

The samples were received intact under chain of custody on March 4, 2015 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hydrogen Sulfide in Air (H,S) Analysis

The samples were prepared in accordance with CAS AQL 110 for hydrogen sulfide in air and analyzed by colorimetric method using a spectrophotometer. This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP scope of accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.



2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161

F: +1 805 526 7270 www.alsglobal.com

ALS Environmental - Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L14-2
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	838341
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-001
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413- 14-5
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA01627201 4-4
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: Tetra Tech, Incorporated Service Request: P1500832

Project ID: West Lake Landfill / 103X9025140058

Date Received: 3/4/2015 Time Received: 11:25 AQL 110 - H2S Air

			Date	Time	S A Q
Client Sample ID	Lab Code	Matrix	Collected	Collected	CA
WAA-01-RH-PS-20150227	P1500832-001	Air	2/27/2015	12:13	X
WAA-02-RH-PS-20150227	P1500832-002	Air	2/27/2015	11:24	X
WAA-03-RH-PS-20150227	P1500832-003	Air	2/27/2015	11:50	X
WAA-04-RH-PS-20150227	P1500832-004	Air	2/27/2015	12:03	X
WAA-05-RH-PS-20150227	P1500832-005	Air	2/27/2015	11:37	X
WAA-04-RH-DU-20150227	P1500832-006	Air	2/27/2015	12:03	X
WAA-00-RH-TB-20150227	P1500832-007	Air	2/27/2015	12:20	X

Radiello - Chain of Custody Record & Analytical Service Request

Page 1 of 1



2655 Park Center Drive, Suite A Simi Valley, California 93065 Phone (805) 526-7161

Correct SR# is P1500832

(ALS)	Fax (805) 52	26-7270		Requested Turnar	ound Time in Busi	ness Days (Surch	ircle	ALS Project No.		20122	
				1 Day (100%) 2 Da	ay (75%) 3 Day (50°	%) 4 Day (35%) 5	Day (25%) 10	Day-Standard		715	00831
							ALS Contact:				
Company Name & Address (Rep	porting Inform	ation)		Project Name			Sue Anderson				<u></u>
Tetra Tech 415 Oak Street,				West Lake Landfil	ŀ			Analysis:			······································
Kansas City, MO 64106				Project Number	7 (e.g. NO₂, S		s, Aldehyde,	1			
				103X9025140058		Ammonia)					
Project Manager			P.O. # / Credit Card		Ì		1				
Rob Monnig (816-412-1775) / D	lave Kinroth	<u>(314-517-67</u>	98)	PO 1111500		Sulfide			Co	mments	
Phone			Attn: Emily Fisher							IIIIIIII	
816-412-1775	816-410-174	18		415 Oak Street, Ka	5 Oak Street, Kansas City, MO 64106						
Email Address for Result Reporting							l e				
emily.fisher@tetratech.com				emily.fisher@tetra		_	2				
Client Sample ID	Laboratory ID Number	Date/Time Start	Date/Time End	Total Sampling Time (minutes)	Sampling Temp 25°C assumed if not specified	Radiello ID Sticker Number	Hydrogen				
WAA-01-RH-PS-20150227	0	2/20/15 @ 13:00	2/27/15 @ 12:13	10033	-5.0	200MH	х				
AA-02-RH-PS-20150227	0	2/20/15 @ 12:07	2/27/15 @ 11:24	10037	-5.0	201MH	х				
∞ WAA-03-RH-PS-20150227	Ø	2/20/15 @ 12:32	2/27/15 @ 11:50	10038	-5.0	202MH	х				
WAA-04-RH-PS-20150227	Ó	2/20/15 @ 12:50	2/27/15 @ 12:03	10033	-5.0	203MH	х				
WAA-05-RH-PS-20150227	0	2/20/15 @ 12:20	2/27/15 @ 11:37	10037	-5.0	204MH	x				
WAA-04-RH-DU-20150227	9	2/20/15 @ 12:50	2/27/15 @ 12:03	10033	-5.0	205MH	х				
WAA-00-RH-TB-20150227	0	2/20/15 @ 10:30	2/27/15 @ 12:20	NA	NA	206MH	х				
Fier I - (Results/Default if not specified Fier II (Results + QC)		ase select of Tier III (Data Tier V (clien	a Validation P	ackage) 10% Surcha		EDD required Ye		Chain of Custon INTACT BRO		Project Requirem	nents (MRLs, QAPP)
Reliquished by: (Signature)	y Bail	eon-	Date:3/2/15	Time: IҶѺѺ	Received b	y: (Signature)	204	Date:	Time:		ļ
Reliquished by: (Signature)	PEN,	rex	Date:	Time:	Received b	y, (Signature)		Date: / 15	Time: 1/25		
Reliquished by: (Signature)			Date:	Time:	Received by	y: (Signature)		Date;		Cooler / Blank Temperature	<u>2</u> 6 €

ALS Environmental Sample Acceptance Check Form

	Tetra Tech, In			•		Work order:	P1500832			
		ndfill / 103X90251400)58							
_	s) received on:				Date opened:		by:	ADAV		
		l samples received by ALS.		-	-	=			dication	of
ompliance	or nonconformity.	Thermal preservation and p	oH will only be e	valuated either at	the request of the	e client and/or as req	uired by the meth-	<u>Yes</u>	<u>No</u>	<u>N/A</u>
1	Were sample	containers properly m	arked with cli	ent sample ID	?			X		
2	Container(s) s	supplied by ALS?						X		
3	Did sample containers arrive in good condition?									
4	Were chain-of-custody papers used and filled out?									
5	Did sample co	ontainer labels and/or	tags agree wi	th custody pap	ers?			X		
6	Was sample v	v olume received adequ	ate for analys	is?				X		
7	Are samples v	vithin specified holding	g times?					X		
8		emperature (thermal p		f cooler at rece	eipt adhered t	o?				X
	Cooler Ten	nperature: 20° C Bla	ank Temperati	ıre: ° C						
9	Was a blank t	tube received?						X		
10	Were custody	seals on outside of co	oler/Box?					X		
		Location of seal(s)?					Sealing Lid?	X		
	Were signatur	re and date included?					_	X		
	Were seals int							X		
	Were custody	seals on outside of sar	nple container	?					X	
	J	Location of seal(s)?	_				Sealing Lid?			X
	Were signatur	re and date included?								X
	Were seals int									X
11		ers have appropriate pr	eservation a	ccording to me	ethod/SOP or	Client specified	information?			X
		ent indication that the si		•		chem specified	miormation.			X
		rials checked for preser	_							×
		nt/method/SOP require			mnla nU and	if naccessary alto	r it?			X
12	Tubes:	Are the tubes capp	•		inpic pri and	ii necessary and	1 10.	\boxtimes		
12		Do they contain m							$\overline{\times}$	
13	Badges:	Are the badges pro		and intact?						×
13	Dauges.	Are dual bed badg			v cannad and	integt?		П		X
			1		7 11			111111111		"""""
Lab	Sample ID	Container	Required	Received	Adjusted	VOA Headspace		ipt / Pres		1
		Description	pH *	pН	pН	(Presence/Absence)	Comme	ıts	
P1500832		Passive (Radiello H2S)								
P1500832 P1500832		Passive (Radiello H2S)								
P1500832		Passive (Radiello H2S) Passive (Radiello H2S)								
P1500832		Passive (Radiello H2S)								
P1500832		Passive (Radiello H2S)								
P1500832		Passive (Radiello H2S)								
Evplair		ies: (include lab sample I	D							

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS Page 1 of 1

Client:

Tetra Tech, Incorporated

Client Project ID: West Lake Landfill / 103X9025140058

ALS Project ID: P1500832

Hydrogen Sulfide

Test Code:

ALS AQL 110

Instrument ID:

P-UV-Vis-01

Analyst:

Sue Anderson

Sampling Media: Radiello Tube(s)

Test Notes:

Date(s) Collected: 2/27/15

Date Received: 3/4/15

Date Extracted: 3/13/15 Date Analyzed: 3/13/15

Desorption Volume: 0.010 Liter(s)

Samn	linα
Samp	шц
	_

Client Sample ID	ALS Sample ID	Time	Dilution	Result	MRL	MDL	Result	MRL	MDL	Data
		Minutes	Factor	ng/Sample	ng/Sample	e ng/Sample	μg/m³	$\mu g/m^3$	$\mu g/m^3$	Qualifier
WAA-01-RH-PS-20150227	P1500832-001	10033	1.0	ND	570	110	ND	1.2	0.24	
WAA-02-RH-PS-20150227	P1500832-002	10037	1.0	ND	570	110	ND	1.2	0.24	
WAA-03-RH-PS-20150227	P1500832-003	10038	1.0	ND	570	110	ND	1.2	0.24	
WAA-04-RH-PS-20150227	P1500832-004	10033	1.0	ND	570	110	ND	1.2	0.24	
WAA-05-RH-PS-20150227	P1500832-005	10037	1.0	ND	570	110	ND	1.2	0.24	
WAA-04-RH-DU-20150227	P1500832-006	10033	1.0	ND	570	110	ND	1.2	0.24	
WAA-00-RH-TB-20150227	P1500832-007	NA	1.0	ND	570	110	NA	NA	NA	
Method Blank	P150313-MB	NA	1.0	ND	570	110	NA	ΝΛ	NA	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit. HUE 17 April 2017

NA = Not applicable.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS Page 1 of 1

Client: Tetra Tech, Incorporated Client Sample ID:

Duplicate Lab Control Sample ALS Project ID: P1500832 **Client Project ID:** West Lake Landfill / 103X9025140058 ALS Sample ID: P150313-LCS,

P150313-DLCS

Date Sampled: NA

Date Received: NA

Volume(s) Analyzed: NA

Date Analyzed: 3/13/15

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary

Test Code: ALS AQL 110 Instrument ID: P-UV-Vis-01 Analyst: Sue Anderson Sampling Media:

Radiello Tube(s)

Test Notes:

	Spike Amount	Re	sult	% Re	covery	ALS	Relative		
Compound	LCS / DLCS µg/L	LCS µg/L	DLCS μg/L	LCS	DLCS	Acceptance Limits	Percent Difference	RPD Limit	Data Qualifier
Hydrogen Sulfide	500	482	477	96	95	73-129	1	5	

ALS Environmental

Hydrogen Sulfide (H2S) in Air Bench Sheet

ALS AQL 110

Service Request#: 71900847

Prep Run #: 23/238

TO SECOND					
-	S. DALLET STATE OF THE STATE OF	Ref#	Concentration (ug/L)	Exp. Date	
1	RAD 171 Stock	924-09/57402	57250 ug/L	11-2/19/1	9/2/15
New Appropries	Sulfide ICV/CCV	524-0408/40]	5/204 25 ug/L	4/8/15	, ,
		C'DWX	Sp-3/13/15	operations of the contract of	•

Coloring Reference or Lot# Solution Reagents Exp. Date Ferric Chloride Amino Sulfurio prepped prior to coloring step radiello Tube

C = 11 - 11 - 11 - 11 - 11 - 11 - 11 - 1							Taulello Tube	1 19717		0///	1	1	
	Calibration Curve: RAD 171 diluted to volume with Deionized Water								e de extraorectura de la compansión de la c			desirence and a second second second second	
10 mL aliquot of each Prep run N.		NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coef	f		
	ug/L (ppl	b)	0	57.3	115	229	573	859	1145				
	Abs. @ 665		0.000	0.061	0.124	0246	0.636	0.954	1.172		39048	F 0E=	1.095
	· · · · · · · · · · · · · · · · · · ·		PERCENT.	A PER				Committee of the control of		DECORRECT	Z) Temp.	Corrected	1
	Carrela ID	Sampling		Extract Volume	Dibation	1	Absorbance @ 665 nm	Corrected Abs.*	Result	Result	Result H ₂ S	Result ug/m ³ ***	A COLUMN TO THE TAXABLE PROPERTY.
	Sample ID	Time (mins)	Temp	(L)	Dilution	Abs.			-7/12/ (ppb)	ng/sample	ppbV**	ug/m	L
	IIB .	y particular monambirms	epinetistical (f	hand Shifting .	Anagoggiani etg	, parameter and	0.000	0,000 g	365/211.6				P
	ICV 570 49/L	Page and the Printer of Printer,	Colorasce)	essential for the second	-		0.556	0.556	520			104/	P
	MA	parameter.	250€	6.010	- Committee	State of the state	0.012		3.66/2116	4110			
-	MAZ			AND COMPANY OF THE PROPERTY OF			0.012	0.012	3.66/211.6	4110		2	6
***************************************	18 500 9/L	Control of the Contro			and the second	0.012	0.536	6,544	508 41 482.38			9610	17/1/2
-	DUS I	N	200		and the same of th	0.012	0.550	0.538	503.21 476.98		MOL	95%	Sign
-	P1506832-1.01	* k0034 -5	5339	Se- 1	Associations	6.012	0.025	0.013	4.61 /211.6	410	20,89 11	11.24 10	124
WHO STREET, SPECIAL	-2016	NO48	Constitution of the Consti	3/13/15	Complete Company	0.012	0.023	0.011	271/41.6	2110	10,89	61,24	
	-3.01	10040			gall Carling Street	0.012	6.02	0.010	1.76/41.6	4110	10,89	41,24	
	-4.01	10937			*Compacting and Additionary	10.012	0.027	0.015	65/1/2/16	4110	6.89	41.24	
- Accessors	-5.0/ W	100/13			30000 market have	0.00	0.024	0.012	3.66/111.6	2116	20.89	41,24	$\prod_{i \in I} f_i$
	1-601	10037	V	1	and the second s	0.012	0.025	0.013	461/41.6	L110	20.89	1404/	
- [MAII MAYAL				Name and Advantage of the Park	-	1.564	1.651	5/19			102/0/	()

*Concentration after blank subtraction (as applicable)

0033

2038

and application and statement (as application)			TOMA	1 7
Comments: ** H_2S in ppbV = ng H_2S / (0.096 ng/ppb · min) x time in minutes	$***ua/m^3 = nnhV H_0 S \times (.3)$	4 09 MW of H _o S / 24 46 gas constant)	Constilled 2	798
Commence: 1120 in ppb 1 - ng 1120 / (0.000 ng/ppb - min/ x time in minuted	, <u>ug/111 ppp v 11/9 // 0</u>	11:00 HIV OI 11/0 / 2 1: 10 gas constant/	CERREUL WO	and the
LCC (F00 us/L); anily tube with 0.5 ml of freehly prepared 10 nom sulfide colution 10.0764s Co	EMA VI-1215		The second secon	وروسته وبسين ويستعدد والأسم
LCC (E00 1) / it t	diver Cultida (22 d	the Atlantik Dillag to 10 and depend the column		A

LCS (500 ug/L): spike tub	e with 0.5 m⊾pt freshly preppe	ed 10 ppm sulfide solution [0.0764g Sodium Sulfide <u>EXP</u>	á
Prepped By:			7
Analyzed By:			

Reviewed By:

Date:

Date:

(ALS)	Enuir	'CHH	ental

Hydrogen Sulfide (H2S) in Air Bench Sheet

115 AQL 110

Service Request#: P1500832

Prep Run #:

Run #:	l	136277 Juge 200

	Ref#	Concentration (ug/L)	Exp. Date
RAD 171 Stock	524 -0151401	57250 ug/L	9/2/15
Sulfide ICV/CCV	924,0408 1401	<i>50</i> 0425 ug/L	4/8/15
en	C GUOX	Or 3/13/15	krazejine fizici etim fizici ilmovesi kraticismica u il

Reagents	Reference or Lot #	Exp. Date	Coloring Solution
Ferric Chloride	524-06151402	1 /2 - /130	10 mL Ferric CI + 50
Amino Sulfuric	524-03/2/502	45 16 111 lung	mL Amino Sulfuric prepped prior to
radiello Tube	14315	1 1	coloring step

Calibration Curve:	RAD 171 di	luted to v	olume with De	eionized Wate	er		Landard Control of the Control of the Control		The second secon	the same of the sa	description of the contract of	z.l
10 mL aliquot of ea	ach Prep run	NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coef	f	
ug/L (pp	b)	0	57.3	115	229	573	859	1145	- 11	25 2°01	C-7	1
Abs. @ 66	Commence of the Commence of th	0.000	0.061	0.124	0.246	0.636	0.954	1.172	0.99	i 85504.	of DE	11,0
	Company Const	Section 18				COLORS BY A SECTIVE	parter terrende de la companya de l La companya de la co	15 miles 10 Miles 15 miles	Figure Calebra	Temp.	Corrected	1
Sample ID	Sampling Time (mins)	Temp	Extract Volume (L)	Dilution	Blank Subtract Abs.	Absorbance @ 665 nm	Corrected Abs.*	Result ug/L (ppb)	Result ng/sample	Result H ₂ S	Result ug/m³***	
0/501837-701	0	anamata-e-gaza	0,010	- Market and American	0.012	0.014	p.002	-5,84/211.6	4110	lá.	x	MAC
1500900-1-01	10034	-3,300)	No. of the last of	0.012	0,030	0.018	9.36 /411.6	2/10	46.8710	1741211	10074
2:01	10048	and the same of th		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0.012	0.031	0.019	10.3/ 4116	4110	10,17	/ .	1
[-3.0]	10040			- Secretary	0.012	0.030	0.018	9.36 /211.6	410			1
1-4.01	10037				0.012	0.030	0.018	9.36/211.6	2/10			1
-5.0/	10042		-		0.012	0.027	0.015	6.51/211.6	2110	\bigcup	V	
-6.0/	10037				0.012	0.033	0.021	12.205,	11568	0.18	0.24	1,
J-7.01.	1 0 T	V	1/	*	0.012	0.014	0.000	-5.84 /211.0	, 2110	10.17	60.20	¥
CV2 5009/1	فعنونوندستيره	agragust 5-50%	der ersvenstrangen	david to the control of the second	Signature China	0.552	0,550	517		,	103%	1
C/32	Nation of the last	-general/2002	- Age - Color of the Color of t	Contract Contract	Nation of the last	0,000	0.000	-7.74/416G				
LCS/DLCS Acceptance Criteria: 90 -110% LCS/DLCS Acceptance Criteria: 73 – 129%												
RPD Acceptance Criteria: ≤5%												
Note: the results as calculated on the Bench Sheet may vary slightly than what is reported due to sig figs used for calculation.												
35.8												

terror sameters			
*Concentration	affer blank	subtraction i	(as applicable)

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb · min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant) Constant (298)

LCS (500 ug/L): spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide (1.01) | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 |

Prepped By:_

Analyzed By:

Reviewed By:

Date: 3/13/15 (2) 1340

Date: 3/13/15 (2) 1340

132	W
11 524-03/8/40/ 500AMNOZ	
3 18/14 Perchased 1	
RICCA Chemical Combony CATNO 5444.5-4	1
LOTE 2403762 120 ml Anley year	K
EXP. 9/30/4	_
3/20/14 524-0320/401 0-/NHZ80r/	
1 5.6 M COM H2804 (EMD 49384; ESP.	,
11/20/14) 1 DU WIDE	-
EX1: 11/20/14	
4/2/14 524-6408/401 Methalene Blue 20/2 804	
100 nl. Purchasul 1914 350000 19/1	È.
Alla Lesas LOT 1208010	
010. 1110/1	 -3
EXT, 47 415	
4/8/14 524-0408/402 01NHZ804	.18
5.6ml Cour H2504 (emp 49284; EV)	
11/20/14) 9 2CW/ DIH20	5.3
EXP: 11/20/14	_
Wholy 524-0422140/ 1000000 Soz Stock	
4/22/14 534-0422/40/ 1000PM SOZ STOCKE 0.15919 N92503 (IT labor WTHA10627; EST: 8/31	1
CONC WIDE GO.	
EXP: 5/6/14	-

1 1/1	524-62121502 AMINE SOLN
3/13/15	2000-4 ADD 6.25 ml ConcH2SUY (EMD SY174, exp. 11/7/19)
Ja.	
132	
	DISSOLVE 1.681 BG NN-Dimethyl-1,4-phluylenediamine 0xylate (Aldrich MKBG 8241V EXP 5/24/16)
	Oxalate (Aldrico MCBGOBATO CA S/04/16)
	THEN DIVITE TO 250 Ml W/ 1:142804 (524-0312)
A TOP	1501).
THE RESERVE OF THE PERSON OF T	QxP: 4/10/15
	524-03/8/50/
1 3/N/K	0./NHZSaf
	5.6ml Conc /+250y (EMD 54174; EXP: 11/7/19)
	12LW/ OIHZE
	(3XP: 3/18/16

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri					
Laboratory:	ALS Environmental (Simi Valley, California)					
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)					
Review Date	April 17, 2015					
Sample Delivery Group (SDG):	P1500900					
Sample Numbers:	WAA-01-RH-PS-20150306, WAA-02-RH-PS-20150306, WAA-03-RH-PS-20150306, WAA-04-RH-PS-20150306, WAA-04-RH-DU-20150306, WAA-05-RH-PS-20150306, and WAA-00-RH-TB-20150306					
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank					
Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pacthat were found, and data qualifications.	atory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies tons applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data					
I, Harry Ellis, certify that all data va	didation criteria outlined in the above-referenced documents were de to the data accorded with those documents.					
Hang N. Elli	17 April 2015					
Certified by Harry Ellis, Chemist	Date					

103I9025140058.000 1 SDG P150900

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) P1500900 included five (5) environmental air (RadielloTM adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for hydrogen sulfide via the laboratory's implementation of the manufacturer's method. The following summarizes the data validation that was performed.

HYDROGEN SULFIDE ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the accepted holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) and field blanks. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All results for the duplicate LCS were within QC limits.

V. Surrogates

Surrogates are not used in this analysis.

VI. Comments

The only detected result was above its sample detection limit but below its sample reporting limit, which corresponds to the lowest calibration standard. The laboratory correctly qualified this extrapolation as estimated and flagged it "J". No further qualifications were applied.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.

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2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

LABORATORY REPORT

March 25, 2015

Rob Monnig Tetra Tech, Incorporated 415 Oak Street Kansas City, MO 64106

RE: West Lake Landfill / 103X9025140058

Dear Rob:

Enclosed are the results of the samples submitted to our laboratory on March 10, 2015. For your reference, these analyses have been assigned our service request number P1500900.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

by out Anderson at 2.70

Sue Anderson Project Manager



2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

P1500900

Client: Tetra Tech, Incorporated

Project: West Lake Landfill / 103X9025140058

00

Service Request No:

CASE NARRATIVE

The samples were received intact under chain of custody on March 10, 2015 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hydrogen Sulfide in Air (H,S) Analysis

The samples were prepared in accordance with CAS AQL 110 for hydrogen sulfide in air and analyzed by colorimetric method using a spectrophotometer. This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP scope of accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.



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www.alsglobal.com

ALS Environmental - Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L14-2
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	876241
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-001
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413- 14-5
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA01627201 4-4
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: Tetra Tech, Incorporated Service Request: P1500900

Project ID: West Lake Landfill / 103X9025140058

Date Received: 3/10/2015 Time Received: 09:30 L 110 - H2S Air

			Date	Time	S A Q
Client Sample ID	Lab Code	Matrix	Collected	Collected	CAS
WAA-01-RH-PS-20150306	P1500900-001	Air	3/6/2015	11:27	X
WAA-02-RH-PS-20150306	P1500900-002	Air	3/6/2015	10:52	X
WAA-03-RH-PS-20150306	P1500900-003	Air	3/6/2015	11:10	X
WAA-04-RH-PS-20150306	P1500900-004	Air	3/6/2015	11:20	X
WAA-05-RH-PS-20150306	P1500900-005	Air	3/6/2015	10:59	X
WAA-04-RH-DU-20150306	P1500900-006	Air	3/6/2015	11:20	X
WAA-00-RH-TB-20150306	P1500900-007	Air	3/6/2015	11:35	X



2655 Park Center Drive, Suite A Simi Valley, California 93065 Phone (805) 526-7161

(ALS)	Fax (805) 52	6-7270		Requested Turnar	ound Time in Busin	ess Days (Surch	arges) please ci	ircle	ALS Project No.	P1500	(and)
				1 Day (100%) 2 Da	ay (75%) 3 Day (50%)	%) 4 Day (35%) 5	Day (25%) 10 I	Day-Standard		FISA	, 100
		_					ALS Contact:				5
Company Name & Address (Rep	porting Inform	ation)		Project Name			Sue Anderson				
etra Tech 15 Oak Street,				West Lake Landfil	1			Analysis:			
Cansas City, MO 64106				Project Number			(e.g. NO ₂ , S	O ₂ , O ₃ , VOC	s, Aldehyde,		
A CONTRACTOR AND A CONT				103X9025140058				Ammonia)			
Project Manager				P.O. # / Credit Card	/ Billing Information						
lob Monnig (816-412-1775) / D	The state of the s	(314-517-67	98)	PO 1111500			Sulfide			Comi	ments
Phone	Fax			Attn: Emily Fishe]		l i		
16-412-1775	816-410-174	8		415 Oak Street, Ka	ensas City, MO 641	06	5				
mail Address for Result Reporting											
mily.fisher@tetratech.com	r			emily.fisher@tetra			윾				
Client Sample ID	Laboratory ID Number	Date/Time Start	Date/Time End	Total Sampling Time (minutes)	1 7/4/C oppulment it not i						
VAA-01-RH-PS-20150306	0	2/27/15 @ 12:13	3/6/15 @ 11:27	10034	-3.3	207MH	х				
VAA-02-RH-PS-20150306	0	2/27/15 @ 11:24	3/6/15 @ 10:52	10048	-3.3	208MH	х				
VAA-03-RH-PS-20150306	W	2/27/15 @ 11:50	11:10	10040	-3.3	209MH	х				
VAA-04-RH-PS-20150306	9	2/27/15 @ 12:03	3/6/15 @ 11:20	10037	-3.3	210MH	х				
VAA-05-RH-PS-20150306	8	2/27/15 @ 11:37	3/6/15 @ 10:59	10042	-3.3	211MH	х				
VAA-04-RH-DU-20150306	9	2/27/15 @ 12:03	3/6/15 @ 11:20	10037	-3,3	21 2M H	х				
VAA-00-RH-TB-20150306	0	2/27/15 @ 10:45	3/6/15 @ 11:35	NA	NA	213MH	х				
Report Tier ier I - (Results/Default if not specifier ier II (Results + QC)		ase select o Tier III (Data Tier V (clien	Validation P	ackage) 10% Surch		EDD required Ye	/	Chain of Custoc	y Seal: (Circle)	Project Requiremen	nts (MRLs, QAPP)
deliquished by: (Signature)	4 Barlo	ou	Date: 3/9/15	Time: 1200	Received b	y: (Signature)	Y	Date:	Time:		
	5 Barlo	40	Date:	Time:	Received b	y: (Signature)		Date: /color	Time:		
eliquished by: (Signature)	**		Date:	Time:	Received b	y: (Signature)		Date:		Cooler / Blank Temperature	°C

ALS Environmental Sample Acceptance Check Form

	Tetra Tech, In					Work order:	P1500900			
•		ndfill / 103X90251400)58							
_	s) received on:			•	Date opened:		_ by:	ADAV		
		l samples received by ALS.							dication	of
ompliance		Thermal preservation and				e client and/or as req	uired by the meth	<u>Yes</u>	<u>No</u>	<u>N/A</u>
1	_	containers properly m	narked with cli	ient sample ID	?			X		
2	Container(s) s	supplied by ALS?						X		
3	Did sample co	ontainers arrive in goo	od condition?					X		
4	Were chain-o	f-custody papers used	and filled out	?				X		
5	Did sample co	ontainer labels and/or	tags agree wi	th custody pap	ers?			X		
6	Was sample v	volume received adequ	ate for analys	is?				X		
7	Are samples v	vithin specified holding	g times?					X		
8	Was proper te	emperature (thermal p	reservation) o	of cooler at reco	eipt adhered t	to?				X
9	Was a trip bl a	ank received?							X	
10	Were custody	seals on outside of co	oler/Box?					X		
		Location of seal(s)?					_Sealing Lid?	X		
	Were signatur	e and date included?						X		
	Were seals int	act?						X		
	Were custody	seals on outside of sar	nple container	:?					X	
		Location of seal(s)?					Sealing Lid?			X
	Were signatur	e and date included?					_			X
	Were seals int	act?								X
11	Do containe	ers have appropriate pr	eservation, a	ccording to me	ethod/SOP or	Client specified	information?			X
	Is there a clie	nt indication that the s	ubmitted samp	oles are pH pro	eserved?	-				X
	Were VOA v	ials checked for presen	nce/absence of	f air bubbles?						X
		nt/method/SOP require			mple pH and	if necessary alte	r it?			X
12	Tubes:	Are the tubes capp	•		pro pri uno	<u>ii iio o o saury</u> uiroo.		$\overline{\mathbf{x}}$		
12	Tubes.								\boxtimes	
1.2	Dodgog	Do they contain m		landintaat?						\boxtimes
13	Badges:	Are the badges pr				:449				X
		Are dual bed badg	ges separated a	ina marviauan	y capped and	I mtact?				
Lab	Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence		pt / Pres Comme		1
P1500900)_001_01	Passive (Radiello H2S)	r	1	1					
21500900		Passive (Radiello H2S)								
P1500900		Passive (Radiello H2S)								
P1500900		Passive (Radiello H2S)								
P1500900		Passive (Radiello H2S)								
P1500900		Passive (Radiello H2S)								
P1500900)-007.01	Passive (Radiello H2S)								
						<u> </u>				
Explair	any discrepanc	ies: (include lab sample l	D numbers):							

RESULTS OF ANALYSIS Page 1 of 1

Client: Tetra Tech, Incorporated

Client Project ID: West Lake Landfill / 103X9025140058

ALS Project ID: P1500900

Hydrogen Sulfide

Test Code: ALS AQL 110 P-UV-Vis-01 Instrument ID: Analyst:

Sue Anderson

Sampling Media: Radiello Tube(s) Test Notes:

Date(s) Collected: 3/6/15

Date Received: 3/10/15 Date Extracted: 3/13/15

Date Analyzed: 3/13/15

Desorption Volume: 0.010 Liter(s)

Sampling

			Samping								
	Client Sample ID	ALS Sample ID	Time	Dilution	Result	MRL	MDL	Result	MRL	MDL	Data
			Minutes	Factor	ng/Sample	ng/Sample	ng/Sample	μg/m³	μg/m³	$\mu g/m^3$	Qualifier
Ē	WAA-01-RH-PS-20150306	P1500900-001	10034	1.0	ND	570	110	ND	1.2	0.23	
	WAA-02-RH-PS-20150306	P1500900-002	10048	1.0	ND	570	110	ND	1.2	0.23	
	WAA-03-RH-PS-20150306	P1500900-003	10040	1.0	ND	570	110	ND	1.2	0.23	
	WAA-04-RH-PS-20150306	P1500900-004	10037	1.0	ND	570	110	ND	1.2	0.23	
	WAA-05-RH-PS-20150306	P1500900-005	10042	1.0	ND	570	110	ND	1.2	0.23	
	WAA-04-RH-DU-20150306	P1500900-006	10037	1.0	120	570	110	0.24	1.2	0.23	J
	WAA-00-RH-TB-20150306	P1500900-007	NA	1.0	ND	570	110	NA	NA	NA	
	Method Blank	P150313-MB	NA	1.0	ND	570	110	NA	NA	NA	

HUG-17 Amil 2015

NA = Not applicable.

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

RESULTS OF ANALYSIS Page 1 of 1

Client: Tetra Tech, Incorporated
Client Sample ID: Duplicate Lab Control Samp

Client Sample ID:Duplicate Lab Control SampleALS Project ID: P1500900Client Project ID:West Lake Landfill / 103X9025140058ALS Sample ID: P150313-LCS,

P150313-DLCS

Date Sampled: NA

Date Received: NA

Volume(s) Analyzed: NA

Date Analyzed: 3/13/15

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary

Test Code: ALS AQL 110
Instrument ID: P-UV-Vis-01
Analyst: Sue Anderson

Sampling Media: Radiello Tube(s)

Test Notes:

	Spike Amount	Re	esult	% Re	covery	ALS	Relative		
Compound	LCS / DLCS µg/L	LCS µg/L	DLCS μg/L	LCS	DLCS	Acceptance Limits	Percent Difference	RPD Limit	Data Qualifier
Hydrogen Sulfide	500	482	477	96	95	73-129	1	5	

ALS Environmental

Hydrogen Sulfide (H₂S) in Air Bench Sheet

ALS AQL 110

Service Request#: <u>P[9]0897</u> <u>(19)090</u>

Prep Run #: 23/238

Run#: 436277

Ref # Concentration (ug/L) Exp. Date

RAD 171 Stock 524-09/57 407 57250 ug/L 344-249/15

Sulfide ICV/CCV 524-0408/40/ 520425 ug/L 4/8//5

Reagents	Reference or Lot#	Exp. Date	Coloring Solution
Ferric Chloride	524-06251402	6/25/15	10 mL Ferric CI + 50
Amino Sulfuric	924-03/2/502	1 64 // 3 // 6 1	mL Amino Sulfuric prepped prior to
radiello Tube	143/5		coloring step

		· /	-0,	•			radicilo rube			0///2	1	1
Calibration Curve:	RAD 171 di	luted to v	olume with De	eionized Wate	er							
10 mL aliquot of e	ach Prep run	NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coeff	f	
ug/L (pp	ob)	0	57.3	115	229	573	859	1145				
Abs. @ 66	5 nm	0.000	0.061	0.124	0246	0.636	0.954	1.172		39048		1.05
		THE STATE					50 (8 Santo) 1502 1504171		DECORRECT	Temp.	Corrected	
Sample ID	Sampling Time (mins)	Temp	Extract Volume (L)	Dilution	Blank Subtract Abs.	Absorbance @ 665 nm	Corrected Abs.*	Result	Result ng/sample	Result H ₂ S	Result ug/m³***	
IIB .	g managina Militarenda reng	equipment ()*	hand Millering	migrationing	*Committee of the Committee of the Commi	0.000	0.000 a	300/2116			N	D
ICV 570 49/L	Parameter Professor	of straight		and the same of th		0.556	0.556	19520			104/0	P
MU	,	250€	6.010	and properties are a	Santa and and and and and and and and and an	0.012	0.012	3.66/2116	4110			i
MAZ			AND CONTRACTOR OF THE PROPERTY			0.012	0.012	3.66 /211.6	4110			-
115 5008/L	. James and the same of the sa			of the same of the	0.012	0.536	6,544	508.41 482.38	4824		96%	7/14
DUS I	·	Ver		and the same of th	0.012	0.550	0.538	503.21 476.98	4770	MOL	95%	5/2
P1506832-1.01	160034 -5	0-3390	Ser ,	Aggrand College on the College of th	0.012	0.025	0.013	4.61 /211.6	2110	20,89 41	11,24 10	24
7-2016	10048	C. desta Construction	313/15	Comparison	0.012	0.023	0.011	271/411.6	2110	10,89	41,24	1
-3.01	10040			garanti especial di inn	0.012	6.020	0.010	1.76/41.6	4110	10,89	41,24	. [
-4.01	10037			**************************************	10.012	0.027	0.015	65/1/2/16	2110	6.89	41.24	
-5.0/ W	10010			Section and the second section and the sectio	0.012	0.024	0.012	3.66/211.6	2116	20.89	4124	
1, -601	10037	V	1	and the second s	0.012	0.025	0.013	4.61/41.6	L110	20.89	1141241	
MI AUGH	T-Marine Annual Inc.		- Managoria de Caración de Car	Name of the Original Property of the Original		0.554	0.654	518			1040/0)
able	- Company of the Comp	\	**Adjournment	-	, position and the same of the	0.000	0.000	-7.74/211.6			•	3,
*Concentration after bla	nk cuhtraction (s	se annlicah	10)					/			18	17

*Concentration after blank subtraction (as applicable)

, , , , , , , , , , , , , , , , , , ,		7600 / E
Comments:** H_2S in ppbV = $ng H_2S / (0.096 ng/ppb · min) x time in m$	inutes; ***ug/m ³ = ppbV H ₂ S x (34.09 MW c	of H ₂ S / 24.46 gas constant) $Magaila = (298)$
1.00 (500 8)		11 50

LCS (500 ug/L): spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Rr. 3/22/19

Prepped By:

Analyzed By:

Date

113/15 (2) 1340

Analyzed By: ______ Reviewed By: _____

(ALS)	Enuir	'CHH	ental

Hydrogen Sulfide (H2S) in Air Bench Sheet

115 AQL 110

Service Request#: P1500832

Prep Run #:

Run #:	l	136277 Juge 200

	Ref#	Concentration (ug/L)	Exp. Date
RAD 171 Stock	524 -0151401	57250 ug/L	9/2/15
Sulfide ICV/CCV	924,0408 1401	<i>50</i> 0425 ug/L	4/8/15
en	C GUOX	Or 3/13/15	krazejine fizici etim fizici ilmovesi kraticisi ci il

Reagents	Reference or Lot #	Exp. Date	Coloring Solution
Ferric Chloride	524-06151402	1 /2 - /130	10 mL Ferric CI + 50
Amino Sulfuric	524-03/2/502	45 16 111 lung	mL Amino Sulfuric prepped prior to
radiello Tube	14315	1 1	coloring step

Calibration Curve:	RAD 171 di	luted to v	olume with De	ionized Wate	er		E. MENOLUSIA MANIERA PARTICOLONIA PETERSE AURACE	a decembracion antigratica com antigrada estra de se		the same of the sa	Andrews assert the opening assert to a section of the section of t	al.
10 mL aliquot of ea	10 mL aliquot of each Prep run NA 0.05			0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coef	f	
ug/L (pp	b)	0	57.3	115	229	573	859	1145	- 11	25 2°01	C-7	1
Abs. @ 66	Commence of the Commence of th	0.000	0.061	0.124	0.246	0.636	0.954	1.172	0.99	i 85504.	of DE	1,0
	Company Const	Section 18			Excellent particular	GEVENUE RATE A SECURITY	THE PROPERTY OF THE PROPERTY OF	15 miles 10 Miles 15 miles	Figure Calebra	Temp.	Corrected	
Sample ID	Sampling Time (mins)	Temp	Extract Volume (L)	Dilution	Blank Subtract Abs.	Absorbance @ 665 nm	Corrected Abs.*	Result ug/L (ppb)	Result ng/sample	Result H ₂ S	Result ug/m³***	
0/501837-701	0	anamata-4-gaza	0,010	- Andrewson and the second	0.012	0.014	p.002	-5,84/211.6	4110	lá.	x	MAC
1500900-1-01	10034	-3,300)	No. of Contract of	0.012	0,030	0.018	9.36 /411.6	2/10	46.8710	1741211	10074
2:01	10048	and the same of th		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0.012	0.031	0.019	10.3/ 4116	4110	10,17	/ .	1
[-3.0]	10040			- Samuel Control of the Control of t	0.012	0.030	0.018	9.36 /211.6	410			
1-4.01	10037				0.012	0.030	0.018	9.36/211.6	2/10			
-5.0/	10042		-	-	0.0/2	0.027	0.015	6.51/211.6	2110	\bigcup	V	
-6.0/	10037			part .	0.012	0.033	0.021	12.205,	11568	0.18	0.24	1,
J-7.01.	1 0 T	V	1/	**************************************	0.012	0.014	0.000	-5.84 /211.0	, 2110	10.17	60.20	Y
CV2 5009/1	· Parantina de la constanta de	Agranger (SSAPA	der new residence conserva-	William Commence of the	Control Control	0.552	0,550	517		,	103%	1
CB2	Salar Sa	-	-48-20-20-20-20-20-20-20-20-20-20-20-20-20-	Contract Section 1	National States	0,000	0.000	-7.74/416G				
	00.41206		ere er		1.0			. 7				
ICV/CCV Acceptance C LCS/DLCS Acceptance							and the second of the second o		**************************************			+
RPD Acceptance Criter	ia: <u><</u> .5%											
Note: the results as ca		nch Sheet ma	ay vary slightly than	what is reported du	ue to sig figs used fo	r calculation.			W_441844000000000000000000000000000000000		ĺ	
us described and			The second On Michigan Strategic in Carbon Commission (Chapter Strategic Inc.)	and the Company of th	Land towns and the second	_1		L		1] ~3

Service Sub-Modern			
*Concentration	after blank	subtraction	(as applicable)

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb · min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant) Constant (298)

LCS (500 ug/L): spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide (1.01) | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 |

Prepped By:_

Analyzed By:

Reviewed By:

Date: 3/13/15 (2) 1340

Date: 3/13/15 (2) 1340

132	
	524-03/8/40/ 500AMNOZ
3/18/14	Perchased 11
	RICCA Chemical Combony Cat No 5444.5-4
	LOTE 2403762 120 ml Amber year
	15xp. 4/2014
3/20/14	1 524-03201401 0-1NH2801
	5.6 M CM H2804 (EMD 49284; ESP;
	11/20/14) 1 20 W/DE
	EX1: 11/20/14
4/8/14	524-6408/401 Methylew Blue 2% 804
	100 rd, purchased 418/14 250000 1
	Alla Acsas LOT 1206010
	ND. 11/8/10
	EN 1 9/9/5
4814	524-04081402 QINHZ804
	5.6ml Cove H2504 (0MD 49284; EV)
	11/20/14) 9 2CW/ WIHZO
	EXP: U/BOITY
4/22/14	534-04221401 1000PM Soz Stocke
8	0.15919 N92503 (IT laber WTHH10627; Ed.: 8/31)
	, conta (1) 2 (1) 0.
	EXP: 5/6/14
3	

1 1/1	524-63121502 AMINE SOLN
- July 19	2000-4 ADD 6.25 ml ConcH2SUY COMD SY174, EXP: 11/7/19
Ja.	
132	
	De SSOLVE 1.681 Bg NN-Dimethyl-1,4-phlnyknedianing 0xylate (Aldrich MKBG 8041V EXP 5/04/16)
	Oxalate (Aldrich MLBG 6541 CN 3/04/16)
	THEN DIVIE TO 250 Ml W/ 1:142 SUY (524-0312)
A TOP	1501).
THE RESERVE OF THE PERSON OF T	QxP: 4/10/15
	524-03/8/50/
1 3/N/K	0./NHZSaf
	5.6ml Conc 1/2504 (EMD 54174; EXP: 11/7/19)
	12LW/ DIHZE
	(3XP: 3/18/16

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	ALS Environmental (Simi Valley, California)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 9, 2015
Sample Delivery Group (SDG):	P1501117
Sample Numbers:	WAA-01-RH-PS-20150313, WAA-02-RH-PS-20150313, WAA-03-RH-PS-20150313, WAA-04-RH-PS-20150313, WAA-04-RH-DU-20150313, WAA-05-RH-PS-20150313, and WAA-00-RH-TB-20150313
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pacthat were found, and data qualifications.	atory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was boratory QC information submitted with the project-specific data
I, Harry Ellis, certify that all data va	alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Elli	9 April 2015
Certified by Harry Ellis, Chemist	Date

103I9025140058.000 1 SDG P1501117

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) P15001117 included five (5) environmental air (RadielloTM adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for hydrogen sulfide via the laboratory's implementation of the manufacturer's method. The following summarizes the data validation that was performed.

HYDROGEN SULFIDE ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the accepted holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) and field blanks. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All results for the duplicate LCS were within QC limits.

V. Surrogates

Surrogates are not used in this analysis.

VI. Comments

All detected results in the field samples were less than the sample reporting limits, which correspond to the lowest calibration standard. The laboratory correctly qualified these results as estimated and flagged them "J". All detected results, including the field duplicate pair, were quite similar.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.

103I9025140058.000 3 SDG P1501117

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2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

LABORATORY REPORT

March 31, 2015

Rob Monnig Tetra Tech, Incorporated 415 Oak Street Kansas City, MO 64106

RE: West Lake Landfill / 103X9025140058

Dear Rob:

Enclosed are the results of the samples submitted to our laboratory on March 19, 2015. For your reference, these analyses have been assigned our service request number P1501117.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Sue Anderson

Project Manager



2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

Service Request No:

P1501117

Client: Tetra Tech, Incorporated

Project: West Lake Landfill / 103X9025140058

CASE NARRATIVE

The samples were received intact under chain of custody on March 19, 2015 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hydrogen Sulfide in Air (H,S) Analysis

The samples were prepared in accordance with CAS AQL 110 for hydrogen sulfide in air and analyzed by colorimetric method using a spectrophotometer. This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP scope of accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.



2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161

F: +1 805 526 7270 www.alsglobal.com

ALS Environmental - Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L14-2
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	838341
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-001
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413- 14-5
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA01627201 4-4
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

DETAIL SUMMARY REPORT

Client: Tetra Tech, Incorporated Service Request: P1501117

Project ID: West Lake Landfill / 103X9025140058

Date Received: 3/19/2015 Time Received: 09:40 QL 110 - H2S Air

			Data	T:	AQ
au a			Date	Time	$ \mathbf{A}\mathbf{S} $
Client Sample ID	Lab Code	Matrix	Collected	Collected	U
WAA-01-RH-PS-20150313	P1501117-001	Air	3/13/2015	09:25	X
WAA-02-RH-PS-20150313	P1501117-002	Air	3/13/2015	09:32	X
WAA-03-RH-PS-20150313	P1501117-003	Air	3/13/2015	09:54	X
WAA-04-RH-PS-20150313	P1501117-004	Air	3/13/2015	10:06	X
WAA-05-RH-PS-20150313	P1501117-005	Air	3/13/2015	09:44	X
WAA-04-RH-DU-20150313	P1501117-006	Air	3/13/2015	10:06	X
WAA-00-RH-TB-20150313	P1501117-007	Air	3/13/2015	10:30	X



2655 Park Center Drive, Suite A Simi Valley, California 93065 Phone (805) 526-7161

(ALS)	Fax (805) 52	26-7270		Requested Turnaround Time in Business Days (Surcharges) please circle 1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard						P1501117	
				. = = (. = = %) = =		,, (30.13)	ALS Contact:				
Company Name & Address (Re	porting Inform	ation)		Project Name			Sue Anderson				
Tetra Tech 415 Oak Street,				West Lake Landfi	1			Analysis:			
Kansas City, MO 64106				Project Number 103X9025140058	400	•	(e.g. NO ₂ , S	SO ₂ , O ₃ , VOC Ammonia)	s, Aldenyde,	w/)	
Project Manager				P.O. # / Credit Car	d / Billing Information	, in 14	•	T			
Rob Monnig (816-412-1775) / [Dave Kinroth	(314-517-67	98)	PO 1111500		77.	Sulfide			Comment	•
Phone	Fax		3.103	Attn: Emily Fishe	r	7	=	10 3		Johnson	2
816-412-1775	816-410-174	18		415 Oak Street, K	ansas City, MO 641	06	S		Free Comment		
Email Address for Result Reporting		***					Jef			-	992
emily.fisher@tetratech.com	07. B 0			emily.fisher@tetra	atech.com) or			CANCES TO SE	* 7
Client Sample ID	Laboratory ID Number	Date/Time Start	Date/Time End	Total Sampling Time (minutes)	Sampling Temp 25°C assumed if not specified	Radiello ID Sticker Number	Hydrogen			A Comment	(gel)
WAA-01-RH-PS-20150313	1	3/6/15 @ 14:06	3/13/15 @ 09:25	9799	9.4	256MH	х		~		3
WAA-02-RH-PS-20150313	2	3/6/15 @ 14:20	3/13/15 @ 09:32	9792	9.4	257MH	X		- 27	*	
WAA-03-RH-PS-20150313	3	3/6/15 @ 14:44	3/13/15 @ 09:54	9790	9.4	258MH	. x	-			
WAA-04-RH-PS-20150313	4	3/6/15 @ 13:52	3/13/15 @ 10:06	9854	9.4	259MH	, x			=	Ÿ
WAA-05-RH-PS-20150313	5		3/13/15 @ 09:44	9793	9.4	260MH	х				
WAA-04-RH-DU-20150313	L	3/6/15 @ 13:52	3/13/15 @ 10:06	9854	9.4	261MH	x				
WAA-00-RH-TB-20150313	٦	3/6/15 @ 13:52	3/13/15 @ 10:30	NA ;	NA	262MH	х	-1		171	* r's
		*					×				1
Report Tie- Fier I - (Results/Default if not specifie Fier II (Results + QC)	r Levels - ple		a Validation P	ackage) 10% Surch	arge	EDD required Ye	25 *	\sim	KEN ABSENT	Project Requirements (N	RLs, QAPP)
Reliquished by: (Signature)	Bouls	agu	Date: 3/17/15	Time: 1200	Received b	y: (Signature)	160		Time:		
Reliquished by: (Signature)	15160		Date:	Time:	Received b	y: (Signature)	2		7 9940	NO	
Reliquished by: (Signature)	,		Date:	Time:	Received b	y: (Signature)		Date:	Time:	Cooler / Blank Temperature	_°C
		- St. 10	3000						7.4		

ALS Environmental Sample Acceptance Check Form

Client:	Tetra Tech, Ir	ncorporated	•	•	_	Work order:	P1501117			
Project:	West Lake La	ndfill / 103X90251400)58		_					
Sample(s) received on:	3/19/15		-	Date opened:	3/19/15	by:	KKEL	PE	
Note: This	form is used for al	1 samples received by ALS.	The use of this fo	orm for custody se	eals is strictly me	eant to indicate pres	ence/absence and n	ot as an ir	ndication	of
ompliance	or nonconformity.	Thermal preservation and	pH will only be e	valuated either at	the request of th	e client and/or as rec	quired by the methor		No	NI/A
	***		1 1 1 1	1.15	0			Yes	No	<u>N/A</u>
1	_	containers properly n	narked with cli	ent sample ID)?			X		
2		supplied by ALS?						X		
3	Did sample co	ontainers arrive in goo	od condition?					X		
4	Were chain-o	f-custody papers used	and filled out	?				X		
5	Did sample co	ontainer labels and/or	tags agree wi	th custody pap	ers?			X		
6	Was sample v	v olume received adequ	ate for analysi	is?				X		
7	Are samples v	vithin specified holding	g times?					X		
8	_	emperature (thermal p	_	f cooler at rec	eipt adhered	to?				\times
	1 1		,		1					
9	Was a hlank t	tube received?							X	
10		seals on outside of co	oler/Roy?					\boxtimes		
10	were custous	Location of seal(s)?					Sealing Lid?	\boxtimes		
	Wana si sa stan						Seamig Liu:	X		
	_	re and date included?						X		
	Were seals int			0						
	Were custody	seals on outside of sar	_						\boxtimes	
		Location of seal(s)?					Sealing Lid?			\boxtimes
	_	re and date included?								X
	Were seals int	tact?								X
11	Do containe	ers have appropriate pr	reservation , a	ecording to me	ethod/SOP or	Client specified	information?			\times
	Is there a clie	ent indication that the s	ubmitted samp	oles are pH pro	eserved?					X
	Were VOA v	<u>rials</u> checked for prese	nce/absence of	f air bubbles?						X
	Does the clien	nt/method/SOP require	that the analy	st check the sa	mple pH and	if necessary alte	er it?			X
12	Tubes:	Are the tubes capp	ed and intact?)				X		
		Do they contain m							X	
12	Dodgog.	Are the badges pr		and intact?						\boxtimes
13	Badges:	-								X
		Are dual bed badg	ges separated a	ina inaiviauaii	y capped and	intact?				
Lab	Sample ID	Container	Required	Received	Adjusted	VOA Headspac	e Recei	pt / Pres	ervation	1
		Description	рН *	pН	pН	(Presence/Absence	e)	Comme	nts	
P1501117	'-001.01	Passive (Radiello H2S)								
P1501117	'-002.01	Passive (Radiello H2S)								
P1501117	-003.01	Passive (Radiello H2S)								
P1501117	'-004.01	Passive (Radiello H2S)								
P1501117		Passive (Radiello H2S)								
P1501117		Passive (Radiello H2S)								
P1501117	-007.01	Passive (Radiello H2S)				-				
					<u> </u>	<u> </u>				
		ies: (include lab sample l	ID numbers):							
amplee w	ere not refrigera	ted								

RESULTS OF ANALYSIS Page 1 of 1

Client:

Tetra Tech, Incorporated

Client Project ID: West Lake Landfill / 103X9025140058

ALS Project ID: P1501117

Hydrogen Sulfide

Test Code:

ALS AQL 110

Instrument ID:

P-UV-Vis-01

Analyst:

Sue Anderson

Sampling Media: Radiello Tube(s)

Test Notes:

Date(s) Collected: 3/13/15 Date Received: 3/19/15

Date Extracted: 3/20/15 Date Analyzed: 3/20/15

Desorption Volume:

0.010 Liter(s)

Samplin	ıg
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		, ,								
Client Sample ID	ALS Sample ID	Time	Dilution	Result	MRL	MDL	Result	MRL	MDL	Data
		Minutes	Factor	ng/Sample	ng/Sample	ng/Sample	μg/m³	$\mu g/m^3$	$\mu g/m^3$	Qualifier
WAA-01-RH-PS-20150313	P1501117-001	9799	1.0	130	570	110	0.24	1.0	0.20	J
WAA-02-RH-PS-20150313	P1501117-002	9792	1.0	260	570	110	0.48	1.0	0.20	J
WAA-03-RH-PS-20150313	P1501117-003	9790	1.0	ND	570	110	ND	1.0	0.20	
WAA-04-RH-PS-20150313	P1501117-004	9854	1.0	240	570	110	0.43	1.0	0.20	J
WAA-05-RH-PS-20150313	P1501117-005	9793	1.0	170	570	110	0.31	1.0	0.20	J
WAA-04-RH-DU-20150313	P1501117-006	9854	1.0	210	570	110	0.38	1.0	0.20	J
WAA-00-RH-TB-20150313	P1501117-007	NA	1.0	ND	570	110	NA	NA	NA	
Method Blank	P150320-MB	NA	1.0	ND	570	110	NA	NA	NA	

HV6 9 April 2915

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

NA = Not applicable.

RESULTS OF ANALYSIS Page 1 of 1

Client: Tetra Tech, Incorporated

Client Sample ID:Duplicate Lab Control SampleALS Project ID: P1501117Client Project ID:West Lake Landfill / 103X9025140058ALS Sample ID: P150320-LCS,

P150320-DLCS

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary

Test Code: ALS AQL 110 Date Sampled: NA
Instrument ID: P-UV-Vis-01 Date Received: NA
Analyst: Sue Anderson Date Analyzed: 3/20/15
Sampling Media: Radiello Tube(s) Volume(s) Analyzed: NA

Test Notes:

	Spike Amount	Re	esult	% Re	covery	ALS	Relative		
Compound	LCS / DLCS µg/L	LCS µg/L	DLCS µg/L	LCS	DLCS	Acceptance Limits	Percent Difference	RPD Limit	Data Qualifier
Hydrogen Sulfide	500	503	505	101	101	73-129	0	5	

Hydrogen Sulfide (H2S) in Air Bench Sheet CAS AQL 110

	Ref#	Concentration (ug/L)	Exp. Date
RAD 171 Stock	524-09151401	57250 ug/L	9/2/15
Sulfide ICV/CCV	534-04051401	506,425 ug/L	4/8/15
	10 12 V/V	V. 16-118	The same and desired the same and the same and

@900x 20-3/2011 S Calibration Curve: RAD 171 diluted to volume with Deionized Water

Reagents	Reference or Lot#	Exp. Date	Coloring Solution
Ferric Chloride	524-06251462	6/25/15	10 mL Ferric CI + 50
Amino Sulfuric	524-03/21502	12/11/11/11	mL Amino Sulfuric prepped prior to
radiello Tube	DC: 143/5 PISO1105& 1012 14/5/	Not the second	coloring step
	PISD1/17 142/5	19/15	07330000 77344-0744 07344-03700 (200

							1.e					1
10 mL aliquot of ea	ich Prep run	NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coef	f	
ug/L (pp	b)	0	57.3	115	229	573	859	1145			110	
Abs. @ 665	5 nm :	0,000	0.057	0.122	0,243	0.582	0.870	1,158	DE CONTER	12547	14/4/30	=1,09
		1.382.38.3			The Property of the				PCIN-E	Temp.	Corrected Z	and
	Sampling		Extract Volume	ut.	Blank Subtract	Absorbance @	Corrected	Result	Result	Result H₂S	Result	no.Anterogradua
Sample ID	Time (mins)	Temp	(L)	Dilution	Abs.	665 nm	Abs.*	ug/L (ppb)፣ላወ		ppbV**	ug/m ³ ***	
ICB2	4 Veligocopusa, valenda	**************************************	-	470 ggarer	*	0.000	6.000	-3.80 LII.6				10
JOV2 9013/C	- managements	No and American Street, Street	and the same of th	*******		0.554	0.554	545			1090	10
MPJ-2		25°C	6n010		and the second s	0.014	0.014	10,1 211.6	4110			
MB2-2			1	*constantion.	Acres and the second	0.014	10,014	10.1 4/1.6	4110			b
USZ 9009/L	**************************************			.pgf50@pgsiding.	0.014	0.553	160.053°	530.38 502.7	3 5027	71%	5 /078	6
DUS9 I	San				0.014	0.555	0.541	532.36 584.6	15046	TUPP	7 1000	R
P1901105-401	1535				6.014	0.020	0.006	2.15 41.6	2110	10.75	41.05	ľ
	1460			turning.	0.014	0.033	0.019	15.032	142.48	1.02	1.42	15
J -6.01	1447	U		6-	0.014	0.025	0.011	7.10 211.6	CHILD STATE	40.80	41.11	
P1501117-1101	9799	9.49		- Gertalismatrium	6,014	0.032	0.018	14.041	133.090	0.174	0,24	1 (J.)
7 -2.01	9792	1			0.014	0.046	0.032	27.915	264597	0.345	0.48	151
J -3,01	9790	T	V	terrent /	0.014	0.028	0.014	10.1 211.6	2110	20.015	L0.623	Ь
CCV1-2 1205/L	A francisco constante	~~	o Yaqiyaarabaaqiishi dada	eranico.	Continue	0.552	0.5528	m5125	43		1090,	K)
as1-2	Annual Control of Control		Name of the Park o	**************************************	No.	0,000	0.600	-3.80 LIII				3.8
***			, ,								-2 2 (5	

*Concentration after blank subtraction (as applicable)

Comments: ${}^{**}H_2S$ in ppbV = ng H_2S / (0.096 ng/ppb * min) x time in minutes; ${}^{***}ug/m^3$ = ppbV H_2S x (34.09 MW of H_2S / 24.46 gas constant)

LCS (500 ug/L): spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Prepped By:

Analyzed By:

Reviewed By:

ICV/CCV Acceptance Criteria: 90 -110% LCS/DLCS Acceptance Criteria: 73 - 129%

Æ	Columbia	
(final)	Columbia Analytical	Services*

Hydrogen Sulfide (H2S) in Air Bench Sheet CAS AQL 110

Prep Run #:__

BATCH	t	 G-}
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Service Request#: <u>P1501105 P1501117 P1501012</u>

Run#: 4375/2-

	Ref#	Concentration (ug/L)	Exp. Date
RAD 171 Stock	524-69/51401	57250 ug/L	9/2/15
Sulfide ICV/CCV	524-0408 140	500425 ug/L	418115
	(D)(2)YN	AV () alastic	Companyage of the Company of the Com

		,	<u> </u>
			Coloring
Reagents	Reference or Lot #	Exp. Date	Solution
Ferric Chloride	524-0629402	6/25/15	10 mL Ferric CI + 50
Amino Sulfuric	924-03/21500	14 11/2/18/11	mL Amino Sulfuric prepped prior to
radiello Tube	RUS PISO 117 143/5 PISO 1105 1012 14/15/	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	calaring step

Calibration Curve:	RAD 171 di	luted to v	olume with De	ionized Wate	er			/		,		
10 mL aliquot of ea	ich Prep run	NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coeff	f	consequence supplies of the su
ug/L (ppl	b)	0	57.3	115	229	573	859	1145	09999	54947	U	1
Abs. @ 665		0.000	0.057	01/22	0,243	0.982	0870	1158	DELEGARATI	w	1 DES	1.055
		256 226 23								Temp.	Corrected /	
	Sampling		Extract Volume	. *	Blank Subtract	Absorbance @	Corrected	Result	Result	Result H ₂ S	Result	NA O THE STATE OF
Sample ID	Time (mins)	Temp	(L)	Dilution	Abs.	665 nm	Abs.*	ug/L (ppb)	ng/sample	ppbV**	ug/m ³ ***	
P150117-4,01	9854	9.4°C	0,0,0	and the second second	10,014	0.043	0.029	24.942	236.417	0.307	0.427	$](\mathcal{J})$
5.01	9793	,	1	June Comment	0.014	0.036	0.022	18.005	179.154	0.23Y	0,326	
6.01	9854	1		· Samuel	6.014	0.040	6.026	21.969	208.291	69270	0,376	
7.01	Ø) intermediates of the	SS-SS-SS-SS-SS-SS-SS-SS-SS-SS-SS-SS-SS-	material control	0.014	0.014	0.000	-3.80 2/16	4116			
P1501012-017.01	1440	25°C		- Carrier of the Carr	0.014	0.014	0,000	-3.80 411.6	Management colony,	40,80	Hill	on the state of th
1 -018,01	1453		100	-mint	0.014	6.015	0.00/	-2.81 411.	2	20,79	4.10	
-019:01	1440			**constant	0.014	0.014	0,000	-3.80 111.6		Za 80	41.11	
-020,01	1440			NEW CONTRACTOR OF THE PARTY OF	0.014	m.014	0.000	-3.80 LII	5	CONTRACTOR OF THE PROPERTY OF	Consumeration of the consumera	response and the second
-021.01	1440			Anne Care	0.014	0.015	0.001	-2.81 411.6	TO THE OWNER OF THE PERSON OF	9	V	To the second se
4 -022.01	\mathcal{Q}	1	1	* mandationers	6.019	0.014	0.000	-380/211.6	W		. /	h
COV2-2 90191	U	, particulare,	© Manufactures non-ser	Policement	© Company of the Comp	1,952	0.550	543	The second secon		1090	7 0
CB1-2	and the same of	Salaran	and the second s	September 1		0.00	0.000	-3.80 411.6			anni amin'ny fivondronan'i Carlon Carlon (amin'ny fivondronan'i Ca	
									The state of the s			
											/	3,8
											. ^	K

*Concentration after blank subtraction (as applicable)				EMP JE,
Comments: <u>**H₂S in ppbV = ng H₂S / (0.096 ng/ppb · min) x time in minutes; ***ug/m³</u>	= $ppbV H_2S x (34)$.09 MW of H ₂ S / 24.46 g	as constant)	OPPECTION (Z98)
_CS (500 ug/L): spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide	CH SIDDIN	_σρ to 1L with DI] up to 10 mL	desorb volume	SAMPUNG RATE
Prepped By:	Wate:	3/20/15	(N/425	20MARING L.
Analyzed By:	Date:	3/20/15	W 1450	
Reviewed By:	Date:	36/10	-702	, and the second
		7.7		

132	
	524-03/8/40/ 500AMNOZ
3/18/14	Perchased 11
	RICCA Chemical Combony Cat No 5444.5-4
	LOTE 2403762 120 ml Amber year
	15xp. 4/2014
3/20/14	1 524-03201401 0-1NH2801
	5.6 M CM H2804 (EMD 49284; ESP;
	11/20/14) 1 20 W/DE
	EX1: 11/20/14
4/8/14	524-6408/401 Methylew Blue 2% 804
	100 rd, purchased 418/14 250000 1
	Alla Acsas LOT 1206010
	ND. 11/8/10
	EN 1 9/9/5
4814	524-04081402 QINHZ804
	5.6ml Cove H2504 (0MD 49284; EV)
	11/20/14) 9 2CW/ WIHZO
	EXP: U/BOITY
4/22/14	534-04221401 1000PM Soz Stocke
8	0.15919 N92503 (IT laber WTHH10627; Ed.: 8/31)
	, conta (1) 2 (1) 0.
	EXP: 5/6/14
3	

1 1/1	524-63121502 AMINE SOLN
- July 19	2000-4 ADD 6.25 ml ConcH2SUY COMD SY174, EXP: 11/7/19
Ja.	
132	
	De SSOLVE 1.681 Bg NN-Dimethyl-1,4-phlnyknedianing 0xylate (Aldrich MKBG 8041V EXP 5/04/16)
	Oxalate (Alarion MEBO 60411 CN 3/04/16)
	THEN DIVIE TO 250 Ml W/ 1:142 SUY (524-0312)
A TOP	1501).
THE RESERVE OF THE PERSON OF T	QxP: 4/10/15
	524-03/8/50/
1 3/N/K	0./NHZSaf
	5.6ml Conc 1/2504 (EMD 54174; EXP: 11/7/19)
	12LW/ DIHZE
	(3XP: 3/18/16

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	ALS Environmental (Simi Valley, California)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 17, 2015
Sample Delivery Group (SDG):	P1501192
Sample Numbers:	WAA-04-RH-PS-20150320, WAA-04-RH-DU-20150320, and WAA-00-RH-TB-20150320
Matrix / Number of Samples:	1 Air Sample, 1 Field Duplicate Sample, and 1 Trip Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pacthat were found, and data qualifications.	atory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data
· · · · · · · · · · · · · · · · · · ·	didation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Elli	17 April 2015
Certified by Harry Ellis, Chemist	Date

1 103I9025140058.000 SDG P151192

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

103I9025140058.000 2 SDG P151192

DATA ASSESSMENT

Sample delivery group (SDG) P1501192 included one (1) environmental air (RadielloTM adsorbent tube) sample and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for hydrogen sulfide via the laboratory's implementation of the manufacturer's method. The following summarizes the data validation that was performed.

HYDROGEN SULFIDE ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the accepted holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) and field blanks. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All results for the duplicate LCS were within QC limits.

V. Surrogates

Surrogates are not used in this analysis.

VI. Comments

The identical detected results in the sample and its field duplicate were above their sample detection limits but below their sample reporting limits, which correspond to the lowest calibration standard. The laboratory correctly qualified these extrapolations as estimated and flagged them "J". No further qualifications were applied.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.

103I9025140058.000 3 SDG P151192

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2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

LABORATORY REPORT

April 9, 2015

Rob Monnig Tetra Tech, Incorporated 415 Oak Street Kansas City, MO 64106

RE: West Lake Landfill / 103X9025140058

Dear Rob:

Enclosed are the results of the samples submitted to our laboratory on March 25, 2015. For your reference, these analyses have been assigned our service request number P1501192.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

By Sue Anderson at 4:07 pm, Apr 09, 2015

Sue Anderson Project Manager



2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

Service Request No:

P1501192

Client: Tetra Tech, Incorporated

Project: West Lake Landfill / 103X9025140058

CASE NARRATIVE

The samples were received intact under chain of custody on March 25, 2015 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

<u>Hydrogen Sulfide in Air (HR, S) Analysis</u>

The samples were prepared in accordance with CAS AQL 110 for hydrogen sulfide in air and analyzed by colorimetric method using a spectrophotometer. This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP scope of accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.



2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161

F: +1 805 526 7270 www.alsglobal.com

ALS Environmental - Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L14-2
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	876241
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-001
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413- 14-5
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA01627201 4-4
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

DETAIL SUMMARY REPORT

Client: Tetra Tech, Incorporated Service Request: P1501192

Project ID: West Lake Landfill / 103X9025140058

Date Received: 3/25/2015 Time Received: 10:00 QL 110 - H2S Air

			Date	Time	SA A
Client Sample ID	Lab Code	Matrix	Collected	Collected	C_{A}
WAA-04-RH-PS-20150320	P1501192-001	Air	3/20/2015	10:08	X
WAA-04-RH-DU-20150320	P1501192-002	Air	3/20/2015	10:08	X
WAA-00-RH-TB-20150320	P1501192-003	Air	3/20/2015	10:38	X



2655 Park Center Drive, Suite A Simi Valley, California 93065 Phone (805) 526-7161

	Phone (805)	526-7161											
(ALS)	Fax (805) 52	26-7270			ound Time in Busi				ALS Project No	P1501192			
				1 Day (100%) 2 Day	ay (75%) 3 Day (50	%) 4 Day (35%) 5		Day-Standard	<u> </u>	1301112			
Company Name & Address (Re	porting Inform	ation)		Project Name			ALS Contact:	·					
4	JOI UITY IEHOTTI	iauvii)		7 #			Sue Anderson						
letra Tech 115 Oak Street,				West Lake Landfi			IO O NO S	Analysis: SO ₂ , O ₃ , VOC					
Kansas City, MO 64106				Project Number 103X9025140058		÷ +	(e.g. 140 ₂ , c	Ammonia)	s, Aluenyue,	A. T.			
Project Manager	10000			P.O. # / Credit Card	d / Billing Information	and Mass	*			1			
Rob Monnig (816-412-1775) / D	ave Kinroth	(314-517-67	98)	PO 1111500	8	- A	Sulfige			Comments			
Phone	Fax			Attn: Emily Fishe	r.		¥ €			Comments			
The state of the s	816-410-174	18		415 Oak Street, Ka	ansas City, MO 641	06	S		7-				
mail Address for Result Reporting						4	je						
emily.fisher@tetratech.com				emily.fisher@tetra	tech.com		<u>ĕ</u> .			L.4.			
Client Sample ID	Laboratory ID Number	Date/Time Start	Date/Time End	Total Sampling Time (minutes)	Sampling Temp 25°C assumed if not specified	Radiello ID Sticker Number	Hydrogen		supra *4				
0		3/13/15 @ 00:00	3/20/15 @ 00:00	0	0.0	0	х				,		
0		1/0/00 @ 00:00	1/0/00 @ 00:00	0	0.0	0	х						
0		1/0/00 @ 00:00	1/0/00 @ 00:00	0	0.0	0	∵ x .		_	s			
VAA-04-RH-PS-20150320		3/13/15 @ 10:14	3/20/15 @ 10:08	10074	11.1	267MH	, = x	30 IS		- ,,			
0		1/0/00 @ 00:00	1/0/00 @ 00:00	0	0.0	0	х						
VAA-04-RH-DU-20150320		3/13/15 @ 10:14	3/20/15 @ 10:08	10074	11.1	268MH	X.						
VAA-00-RH-TB-20150320		3/13/15 @ 10:30	3/20/15 @ 10:38	NA .	NA NA	264MH	х				1:1		
							· ».	-			·		
	Levels - plea									Project Requirements (MRLs, QAPP	5		
ier I - (Results/Default if not specified ier II (Results + QC)		Tier III (Data Tier V (clien		ackage) 10% Surch		EDD required Ye		Chain of Custoo	ry Seal: (Circle) KEN ABSENT	e de la companya de l			
deliquished by: (Signature) Tmp	1 Barlo	oon	Date: 3/24/15	Time: .		y: (Signature)	FRICE	Date:	Time: `.				
teliquished by: (Signature)	pen of		Date:	Time:	Received b	/Claused use)	Ver "	Date: 3/25/15	Time: 1061	no gel pucks			
deliquished by: (Signature)	4 :		Date: -	Time:	Received b	y: (Signature)		Date:	Time:	Cooler / Blank Temperature°C	Contraction of		

ALS Environmental Sample Acceptance Check Form

	Tetra Tech, In					Work order:	P1501192			
-		ndfill / 103X90251400	058							
	s) received on:				Date opened:		by:	KKEL		
		l samples received by ALS.			-	=			dication	of
ompiiance	or nonconformity.	Thermal preservation and	pH will only be e	valuated either at	the request of the	e client and/or as re	quired by the meth	od/SOP. Yes	No	<u>N/A</u>
1	Were sample	containers properly n	narked with cli	ient sample ID	?			X		
2		supplied by ALS?		•				X		
3	Did sample co	ontainers arrive in goo	od condition?					X		
4	Were chain-o	f-custody papers used	and filled out	?				X		
5	Did sample co	ontainer labels and/or	tags agree wi	th custody pap	ers?			X		
6	Was sample v	volume received adequ	ate for analysi	is?				X		
7	Are samples v	vithin specified holding	g times?					X		
8	Was proper te	emperature (thermal p	reservation) o	f cooler at rece	eipt adhered t	to?				X
									_	
9		tube received?						X		
10	Were custody	seals on outside of co						X		
		Location of seal(s)?					Sealing Lid?			
	=	e and date included?						X		
	Were seals intact?									
	Were custody seals on outside of sample container?									
	Location of seal(s)? Sealing Lid?									
	Were signature and date included?									
11	Were seals int				41 - 1/COD	C1:	l : C			\boxtimes
11		ers have appropriate pr ent indication that the s		•		Client specified	information?			⊠ ⊠
		ials checked for present	_		oservea.					\boxtimes
	· ·	at/method/SOP require			mnle nH and	if necessary alt	ar it?			\boxtimes
12	Tubes:	Are the tubes capp	•		impie pri and	ii necessary are	or it.	\boxtimes		
12	1 does.	Do they contain m							\boxtimes	
13	Badges:	Are the badges pr		and intact?				П		IXI
13	Dauges.	Are dual bed badg			v canned and	intact?				\boxtimes
Lab	Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence		ipt / Pres Commer		1
P1501192	2-001-01	Passive (Radiello H2S)	P	P	P	(Tresence, Tresence	9/			
P1501192		Passive (Radiello H2S)								
P1501192	2-003.01	Passive (Radiello H2S)								
Explair	n any discrenanc	ies: (include lab sample l	ID numbers):							
		- Carrier Inc Champio								

RESULTS OF ANALYSIS Page 1 of 1

Client:

Tetra Tech, Incorporated

Client Project ID: West Lake Landfill / 103X9025140058

ALS Project ID: P1501192

Hydrogen Sulfide

Test Code:

ALS AQL 110

Instrument ID:

P-UV-Vis-01

Analyst:

Sue Anderson

Sampling Media: Radiello Tube(s)

Test Notes:

Date(s) Collected: 3/20/15 Date Received: 3/25/15

Date Extracted: 4/8/15

Date Analyzed: 4/8/15 Desorption Volume:

0.010 Liter(s)

Sampling

		Samping								
Client Sample ID	ALS Sample ID	Time	Dilution	Result	MRL	MDL	Result	MRL	MDL	Data
		Minutes	Factor	ng/Sample	ng/Sample	ng/Sample	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	Qualifier
WAA-04-RH-PS-20150320	P1501192-001	10074	1.0	150	570	110	0.25	0.98	0.19	J
WAA-04-RH-DU-20150320	P1501192-002	10074	1.0	150	570	110	0.25	0.98	0.19	J
WAA-00-RH-TB-20150320	P1501192-003	NA	1.0	ND	570	110	NA	NA	NA	
Method Blank	P150408-MB	NA	1.0	ND	570	110	NA	NA	NA	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

ME 17 MM. 1 2015

NA = Not applicable.

RESULTS OF ANALYSIS Page 1 of 1

Client: Tetra Tech, Incorporated
Client Sample ID: Duplicate Lab Control Sample

Client Sample ID:Duplicate Lab Control SampleALS Project ID: P1501192Client Project ID:West Lake Landfill / 103X9025140058ALS Sample ID: P150408-LCS,

P150408-DLCS

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary

Test Code: ALS AQL 110 Date Sampled: NA
Instrument ID: P-UV-Vis-01 Date Received: NA
Analyst: Sue Anderson Date Analyzed: 4/08/15
Sampling Media: Radiello Tube(s) Volume(s) Analyzed: NA

Test Notes:

	Spike Amount	Re	esult	% Re	covery	ALS	Relative		
Compound	LCS / DLCS µg/L	LCS µg/L	DLCS µg/L	LCS	DLCS	Acceptance Limits	Percent Difference	RPD Limit	Data Qualifier
Hydrogen Sulfide	500	502	499	100	100	73-129	0	5	



2655 Park Center Drive, Suite A

Simi Valley, CA 93065

Hydrogen Sulfide (H2S) in Air Bench Sheet

ALS AQL 110

150/192 PT501359

Prep Run #: 233255

Run#: 439775

 Ref #
 Concentration (ug/L)
 Exp. Date

 RAD 171 Stock
 534-045540
 57250 ug/L
 9/2/15

 Sulfide ICV/CCV
 524-0461501
 500-425-ug/L
 4/1/14

Reagents Reference or Lot # Exp, Date Solution

Ferric Chloride 524 - 06257402 6/25//5 10 mL Ferric CI + 50

Amino Sulfuric 524 - 03/2/502 4/12//5 mL Amino Sulfuric prepped prior to radiello Tube 143/5 09/C coloring step

Calibration Curve: RAD 171 diluted to volume with Deionized Water

		p	****						-			~
10 mL aliquot of ea	ch Prep run	NA.	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50	ado Caracteria de Caracteria d	Corr. Coeff	f	abilities and the second of the second
ug/L (ppl	0)	0	57.3	115	229	573	859	1145	- Callet	70711	ALESSO CONTRACTOR	1
Abs. @ 665		0.000	0.058	0.124	0.246	0.585	0.872	1.169	0.7777	35305	Ø	E=
					1,755 (1.56)	THE COMMENT OF THE PARTY OF	Transcription of the second			Temp.	Corrected	4
		www.					0		D 1	Describilies	Result	
Sample ID	Sampling Time (mins)	Temp	Extract Volume (L)	Dilution	Abs.	Absorbance @ 665 nm	Corrected Abs.*	Result ug/L (ppb)	Result ng/sample	Result H ₂ S	ug/m ³ ***	
ICA /	(11110)	remp	Name y	Dilution	4	6.000	0.00 D	-4.15/211.6	 	PPZ		1)
10 50 91 L	**************************************	· ·	Company of the Compan	and the second s	C. MICHIGAN	6,550	0.550	637			1070/	杨
MBI		250	0,010	***		0,005	0.005	037 /21/16	4110			1
MB7	**************************************		i	Carried Comp.	Samuel Control of the	0.005	0-005	0.77 /4/60	4110		e me	1,
US 500 1914				Application of the second of t	0,005	0,547	0.542	52957 401.90	5020		100%	12
AUS I	(_{OSS} STREET	1		Natural Constitution of the Constitution of th	0,005	0.544	0539	526102 4991	6 4992		1000/	55
01501192-1.01	10074	111100		AND THE STREET, SALES	0.005	0.025	0.020	15,543	147.323	0.18	0,25	1.
7 -2.0/	10074	T		- Parkers	0.005	0.025	0.630	15.543	147.323	0.18	0.25] \
-3.01	Ø	NA		Commence	0.005	0.006	0.001	-3.17/2/11	6-6110			
P1501359-1.01	10046	9.40			0.005	0.000	6.017	12.588	的外分子	22/0.15	0.21	
7-2.0/	10046	9.4%		**	0.005	66000	0.017	12.588	119.32/	0.15	0,21	12
U-3.0/	' Ø	ΝA	V	***	0.005	0.006	0.00.1	-3.17/41.6	4110			V)
cev/ 500310	Windows and Comp.	No. companied to the contract of the contract	California Communication Commu	- Commence of the last of the	Commence	6.550	0,50	537			10 fo	KO
Clb'	4-managements	and similar.	-	(Georgia State Control of the Control	0.000	0.000	-4.15/LHO	6] ;
Concentration after blas	ale aubtraction (ac applicab	/o)							~~~~~	a /V	

*Concentration after blank subtraction (as applicable)

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant) Characteristics

LCS (500 ug/L): spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Do 17 spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Sodium Sulf

Prepped By: Av Date: 4/8

Analyzed By:

Reviewed By:

Date: 4/8/15 @ /300
Date: 4/9/1

SAMAING RATE

ICV/CCV Acceptance Criteria: 90 -110% LCS/DLCS Acceptance Criteria: 73 - 129%

Ao a	
: 152	
a Istalia	SUL-ADDITION (MONTHS (LI
7/19	5 154 05/10150 1000 M3 STOCK
1	0.3141 & NH4CI (BMD W) 11C; EXP: 6/5/9)1
	100 M W/ SAY 63261507)-
	EXP: 9/26/15
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4/1/05	304-04011800 0.1 NIACSOL
	5.6ml Conc /1/5 Soy (eMD 54/74; HP11)7
	12/W/DE HOD!
	DIP: 3/5/1/2 4/1/16
	Bullion 1
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Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	ALS Environmental (Simi Valley, California)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	April 20, 2015
Sample Delivery Group (SDG):	P1501359
Sample Numbers:	WAA-04-RH-PS-20150327, WAA-04-RH-DU-20150327, and WAA-00-RH-TB-20150327
Matrix / Number of Samples:	1 Air Sample, 1 Field Duplicate Sample, and 1 Trip Blank
documents entitled "Contract Labor Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pacthat were found, and data qualifications.	o the U.S. Environmental Protection Agency (EPA) Region 7 atory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ons applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data
· · · · · · · · · · · · · · · · · · ·	de to the data accorded with those documents.
Hang N. Elli	20 April 2015
Certified by Harry Ellis, Chemist	Date

103I9025140058.000 1 SDG P1501359

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

103I9025140058.000 2 SDG P1501359

DATA ASSESSMENT

Sample delivery group (SDG) P1501359 included one (1) environmental air (RadielloTM adsorbent tube) sample and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for hydrogen sulfide via the laboratory's implementation of the manufacturer's method. The following summarizes the data validation that was performed.

HYDROGEN SULFIDE ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the accepted holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) and field blanks. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All results for the duplicate LCS were within QC limits.

V. Surrogates

Surrogates are not used in this analysis.

VI. Comments

The identical detected results in the sample and its field duplicate were above their sample detection limits but below their sample reporting limits, which correspond to the lowest calibration standard. The laboratory correctly qualified these extrapolations as estimated and flagged them "J". No further qualifications were applied.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.

103I9025140058.000 3 SDG P1501359

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LABORATORY REPORT

April 17, 2015

Rob Monnig Tetra Tech, Incorporated 415 Oak Street Kansas City, MO 64106

RE: West Lake Landfill / 103X9025140058

Dear Rob:

Enclosed are the results of the samples submitted to our laboratory on April 3, 2015. For your reference, these analyses have been assigned our service request number P1501359.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Sue Anderson

Project Manager

Client: Tetra Tech, Incorporated Service Request No: P1501359

Project: West Lake Landfill / 103X9025140058

CASE NARRATIVE

The samples were received intact under chain of custody on April 3, 2015 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hydrogen Sulfide in Air (H,S) Analysis

The samples were prepared in accordance with CAS AQL 110 for hydrogen sulfide in air and analyzed by colorimetric method using a spectrophotometer. This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP scope of accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

ALS Environmental - Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L14-2
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	876241
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-001
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413- 14-5
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA01627201 4-4
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

DETAIL SUMMARY REPORT

Client: Tetra Tech, Incorporated Service Request: P1501359

09:55

Project ID: West Lake Landfill / 103X9025140058

Lab Code

P1501359-001

P1501359-002

P1501359-003

Matrix

Air

Air

Air

3/27/2015

Date Received: 4/3/2015 Time Received: 10:05

Client Sample ID

WAA-04-RH-PS-20150327

WAA-04-RH-DU-20150327

WAA-00-RH-TB-20150327

X



2655 Park Center Drive, Suite A Simi Valley, California 93065 Phone (805) 526-7161

(ALS)	Fax (805) 5	26-7270			round Time in Busi				ALS Project No	010010		
			150	1 Day (100%) 2 D	ay (75🐒 3 Day (50	%) 4 Day (35%) 5	Day (25%) 10 I	Day-Standard		P1501359		
						Ĺ	ALS Contact:			i i		
Company Name & Address (Re	eporting Inform	ration)		Project Name	7		Sue Anderson	<u> </u>				
Tetra Tech 415 Oak Street,				West Lake Landfi	ill	<u> </u>	(a = 110 a	Analysis:	_ & - -	,		
Kansas City, MO 64106			Å.	Project Number		₩ 1 se	(e.g. NO ₂ , S		s, Aldehyde,			
			· · · · · · · · · · · · · · · · · · ·	103X9025140058				Ammonia)				
Project Manager				P.O. # / Credit Car	d / Billing Information	- 1						
Rob Monnig (816-412-1775) /		(314-517-67	'98)	PO 1111500		2	Sulfide]	Comments	ŕ	
Phone	Fax			Attn: Emily Fishe		5 -			001111101100			
816-412-1775	816-410-174	18		415 Oak Street, K	ansas City, MO 641	တို	72					
Email Address for Result Reporting			•			Ê	<u>B</u>			3		
emily.fisher@tetratech.com	emily.fisher@tetratech.com				atech.com	**	Ē			والمسرعتا والمار		
Client Sample ID	Laboratory ID Number	Date/Time Start	Date/Time End	Total Sampling Time (minutes)	Sampling Temp 25°C assumed if not specified	Radiello ID Sticker Number	Hydrogen			<u></u>	, 45 x	
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WAA-04-RH-PS-20150327	0	3/20/15 @ 10:10	3/27/15 @ 09:36	10046	9.4	172CY	X					
		1/0/00 @ 00:00	1/0/00 @ 00:00	0	0.0	0	х					
WAA-04-RH-DU-20150327	1	3/20/15 @ 10:10	3/27/15 @ 09:36	10046	9.4	173CY	x					
WAA-00-RH-TB-20150327	3	3/20/15 @ 09:20	3/27/15 @ 09:55	NA ş	NA NA	174CY	х			-	*13	
							ts	- ,				
Report Tie Tier I - (Results/Default if not specific Tier II (Results + QC)	r Levels - ple ed)	ase select of Tier III (Date Tier V (clier	a Validation P	ackage) 10% Surch		EDD required Ye	s '	Chain of Custod	dy Seal: (Circle) KEN ABSENT	Project Requirements (MF	RLs, QAPP)	
Reliquished by: (Signature) Tmy Bonloom Date: 3/31/15				Time: 1040	Received b	y: (Signature) FEN	V)P	Date:	Time: ▼			
	m of		Date:	Time: Received by (Signature)				Pate) //2/c5	Time: /005	¥		
Reliquished by: (Signature)			Date:	Time:	Received b	y: (Signature)		Date:	Time:	Cooler / Blank 2000 Temperature 2000	°C	

ALS Environmental Sample Acceptance Check Form

Client:	Tetra Tech, In	corporated			_	Work order:	P1501359			
-		ndfill / 103X90251400)58							
	s) received on:				Date opened:		by:	KKEL		
		samples received by ALS.			-	=			dication	of
ompliance	or nonconformity.	Thermal preservation and	pH will only be e	valuated either at	the request of the	e client and/or as re	quired by the meth	od/SOP. <u>Yes</u>	No	N/A
1	Were sample	containers properly m	arked with cli	ient sample ID	9			X		
2		upplied by ALS?	idiked with en	ient sample 1D	•			X		
3		ontainers arrive in goo	nd condition?					×		
4	-	f-custody papers used		9				X		
5		ontainer labels and/or			ers?			X		
6	_	volume received adequ		• • •				×		
7	_	vithin specified holding						X		
8	_	mperature (thermal p		f cooler at rece	eint adhered t	ro?				×
Ü		perature: 28° C Bla			orpe donorou e		Packs	_	_	
9		tube received?	in remperati			301	i dello	X		
10		seals on outside of co	oler/Box?					X		
10	Trois castoa,	Location of seal(s)?					Sealing Lid?			
	Were signatur	e and date included?						X		
	Were seals int							X		
Were custody seals on outside of sample container?									X	
Location of seal(s)? Sealing Lid? □										X
	Were signatur	e and date included?					_			X
	Were seals int									X
11	Do containe	rs have appropriate pr	eservation, a	ccording to me	ethod/SOP or	Client specified	l information?			X
		nt indication that the s		•		•				X
	Were VOA v	ials checked for presen	nce/absence of	f air bubbles?						X
	Does the clien	t/method/SOP require	that the analy	st check the sa	mple pH and	if necessary alto	er it?			X
12	Tubes:	Are the tubes capp	•		1 1			X		
		Do they contain m							X	
13	Badges:	Are the badges pr		and intact?				$\overline{\Box}$	П	N N
10		Are dual bed badg			v capped and	intact?				$\overline{\mathbf{X}}$
T -1.	CI- ID									
Lab	Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence		ipt / Pres Comme		1
P1501359) <u>-001 01</u>	Passive (Radiello H2S)	T	r	1		7			
P1501359		Passive (Radiello H2S)								
P1501359		Passive (Radiello H2S)								
							+			
Evnlair	any discrenance	ies: (include lab sample l	D numbers):				•			
Lapian	i any anscrepance	ies. (include lab sample l	~ numbers).							

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

RESULTS OF ANALYSIS
Page 1 of 1

Client:

Tetra Tech, Incorporated

Client Project ID: West Lake Landfill / 103X9025140058

ALS Project ID: P1501359

Hydrogen Sulfide

Test Code:

ALS AQL 110

Instrument ID:

P-UV-Vis-01

Analyst:

Sue Anderson

Sampling Media:

Radiello Tube(s)

Test Notes:

Date(s) Collected: 3/27/15

Date Received: 4/3/15
Date Extracted: 4/8/15

Date Analyzed: 4/8/15

Desorption Volume:

0.010 Liter(s)

Sampling

ALS Sample ID	Time	Dilution	Result	MRL	MDI.	Result	MDI	MDI	Distri
51-21-21	Minutes	Factor	ng/Sample	ng/Sample	·		471		Data Qualifier
P1501359-001	10046	1.0	120	570	110				1
P1501359-002	10046	1.0	120	570	110				7
P1501359-003	NA	1.0	ND	570	110				J
P150408-MB	NA	1.0	ND	570	110	NA			
	P1501359-001 P1501359-002 P1501359-003	ALS Sample ID Time Minutes P1501359-001 10046 P1501359-002 10046 P1501359-003 NA	ALS Sample ID Time Dilution Minutes Factor P1501359-001 10046 1.0 P1501359-002 10046 1.0 P1501359-003 NA 1.0	ALS Sample ID Time Minutes Factor ng/Sample P1501359-001 10046 1.0 120 P1501359-002 10046 1.0 120 P1501359-003 NA 1.0 ND	ALS Sample ID Time Dilution Result MRL mg/Sample P1501359-001 10046 1.0 120 570 P1501359-002 10046 1.0 120 570 P1501359-003 NA 1.0 ND 570 P150408 MRD	ALS Sample ID Time Minutes Factor Negroup NRL MDL Ng/Sample Ng/Sam	ALS Sample ID Time Minutes Factor ng/Sample ng/Sample ng/Sample μg/m³ P1501359-001 10046 1.0 120 570 110 0.21 P1501359-002 10046 1.0 120 570 110 0.21 P1501359-003 NA 1.0 ND 570 110 NA	ALS Sample ID Time Minutes Dilution Factor Result ng/Sample MRL ng/Sample ng/Sample MDL ng/Sample ng/Sample Result ng/m³ MRL ng/m³ P1501359-001 10046 1.0 120 570 110 0.21 1.0 P1501359-002 10046 1.0 120 570 110 0.21 1.0 P1501359-003 NA 1.0 ND 570 110 NA NA P150408-MB NA 1.0 ND 570 110 NA NA	ALS Sample ID Time Minutes Dilution Factor Result ng/Sample MRL ng/Sample ng/Sample MDL ng/Sample ng/Sample Result ng/Sample ng/Sample MRL ng/m³ MRL ng/m³ MRL ng/m³ MDL ng/m³ P1501359-001 10046 1.0 120 570 110 0.21 1.0 0.19 P1501359-002 10046 1.0 120 570 110 0.21 1.0 0.19 P1501359-003 NA 1.0 ND 570 110 NA NA NA P150408-MB NA 1.0 ND 570 110 NA NA NA

HUG 29 April 2915

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

NA = Not applicable.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

RESULTS OF ANALYSIS
Page 1 of 1

Client: Tetra Tech, Incorporated
Client Sample ID: Duplicate Lab Control Sample

Duplicate Lab Control SampleALS Project ID: P1501359West Lake Landfill / 103X9025140058ALS Sample ID: P150408-LCS,

P150408-DLCS

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary

Test Code: ALS AQL 110
Instrument ID: P-UV-Vis-01
Analyst: Sue Anderson
Sampling Media: Radiello Tube(s)

Test Notes:

Client Project ID:

Date Sampled: NA
Date Received: NA
Date Analyzed: 4/08/15
Volume(s) Analyzed: NA

	Spike Amount	Re	sult	% Re	covery	ALS	Relative		
Compound	LCS / DLCS µg/L	LCS µg/L	DLCS μg/L	LCS	DLCS	Acceptance Limits	Percent Difference	RPD Limit	Data Qualifier
Hydrogen Sulfide	500	502	499	100	100	73-129	0	5	



2655 Park Center Drive, Suite A

Simi Valley, CA 93065

Sulfide ICV/CCV

Hydrogen Sulfide (H2S) in Air Bench Sheet

ALS AQL 110

150/192 P150/359

500_425 ug/L

Prep Run #: 233255

Run#: 439775

Ref# Concentration (ug/L) Exp. Date
RAD 171 Stock らはーパはりが 57250 ug/L a/3/(5

Reagents Reference or Lot # Exp, Date Solution

Ferric Chloride \$34 - 062574 00 6/25/15 10 mL Ferric CI + 50

Amino Sulfuric \$724 - 03/2/50 2 4/12/15 mL Amino Sulfuric prepped prior to radiello Tube 143/5 09/15 coloring step

Calibration Curve: RAD 171 diluted to volume with Deionized Water

524-04011501

	The second secon	1	T	-	1	1	T	T	T .			1
10 mL aliquot of each Prep run		NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coeff	:	
ug/L (ppb)		0	57.3	115	229	573	859	1145	0.49935305		ALEGO COLOR	
Abs. @ 665 nm		0.000	0.058	0.124	0.246	0.585	0.872	1.169			D	F=/
					100000000000000000000000000000000000000	STATE OF STA	Property and the second		TO RECEIVE TO SERVICE	Temp.	Corrected	1
	Sampling	a Androide Management	Extract Volume		Blank Subtract	Absorbance @	Corrected	Result	Result	Result H ₂ S	Result	
Sample ID	Time (mins)	Temp	(L)	Dilution	Abs.	665 nm	Abs.*	ug/L (ppb)	ng/sample	ppbV**	ug/m ³ ***	
ICA 1	и зараднямирь	وسسي	× Approximately and the	*Concentration of the contract	Name and Address of the Owner, where the Owner, which is the	6.000	0.000	-4.15/211.6				
ICV 20091	***************************************	Landing	7.5	ACCRECATE AND ADDRESS OF THE PARTY OF THE PA		6.550	0.550	537			1076	D
MBI		250	0,010	Contract Contract Contract	4 (00)	0,005	0.005	0.77 /211/6	2110			
MBZ J	**************************************		İ	Carried States	An companion and the	0.005	0-005	0.77 /21/2	410		L.	7
ils 5001910	ويعتشون			Nago jugo State (State State S	0,005	0,547	0.542	52457 50196	5020		1004	824
BUS I	S _{TORN} ERINA	4		Notation and American	0,000	0.544	0539	52662 4991	6 4992		1000/	55 A
P1501192-1.01	10074	11.100	i de la companya de	particular description.	0.005	0.025	0.020	15,543	147.323	0.18	0,25	$]$ \tilde{J}
1 -20/	10074	J.		, processor and the second	0.005	0.025	0.630	15.543	147.323	0.18	0.25	J
-3.01	0	NA		Consequence	0.005	0.006	0.001	-3.17/2/11	4 6110			
P1501359-1.01	10046	9.40			0.005	0.000	6.017	12.588	MA-133	22/0.15	0,21	
7-2.0/	10046	9.4%	ه ا	*COMPANION CONTRACTOR AND	0.005	66000	0.017	12.588	119.32/		0,21	T
U-30/	8	NΑ	V	The state of the s	0,005	0.006	0.00.1	-3.17/416	110			1
cev/ 50031C	· Commence of	CAMPAGAMA.	Congression.		Commence	6.550	0,550	537			1070	Ø
ClB'	Automorphisms.	and the second	Constitution	C	Companyana	0.000	0.000	-4.15/2110	6			3.
Concentration after blank subtraction (as applicable)												

*Concentration after blank subtraction (as applicable)

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant) Court

LCS (500 ug/L): spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide Dig VF771b up to 1L with DI] up to 10 mL desorb volume

Date: 4/8/15 (W 1/30

Date: 4/8/15 (a)

SAMAINET BAPE

Analyzed By:

Reviewed By:

Prepped By: / KK

ICV/CCV Acceptance Criteria: 90 -110% LCS/DLCS Acceptance Criteria: 73 − 129% RPD Acceptance Criteria: ≤5%

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: 152	
alache	mil annulas impalli (//
3/19/18	SHE OGHOLSOS 1000 NAS STOCK
Ja.	0.25416 NHUCH (BUD WJIIC: EXP. 6/5/9) 1
	100 ml 11 501 AM 1509)
	100/N W SAY 950/500)-
~	EXT: 9/06/15
111	$\frac{1}{2}$
1.4/1/18	524-04011501 Medaykul Kul 1/0 8km
	imme plastice probable.
- 60	NIC Past C PACKAGE AODY
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ž.	exp: 4/1/16
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# 4/1/X	524-0401/502 0./A/AZOU
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ica-	5.6 ml Che 179 Suf (chus 39114) 611:11/7,
	12 CW/DI HZO,
	DIP: 3/5/1/2 4/1/16
	Sullis .
	7015
No.	